intended to protect railroad employees. FRA believes that inspectors of equipment must be able to ascertain if brakes are applied or released without placing themselves in a vulnerable position. This final rule allows railroads the flexibility of using a reliable indicator in place of requiring direct observation of the brake application or piston travel because the designs of many of the brake systems used on passenger equipment make direct observation of the brakes extremely difficult. Brake system piston travel or piston cylinder pressure indicators have been used with satisfactory results for many years. Although indicators do not provide 100 percent certainty that the brakes are effective, they have proven effective enough to be preferable to requiring an inspector to assume a dangerous position.

Paragraph (c) is virtually identical to the requirement contained in § 238.231(c), and is a fundamental brake system performance requirement that an emergency brake application feature be available at any time and produce an irretrievable stop. This paragraph contains an additional requirement that a means to actuate the emergency brake be provided at two locations in each unit of the train. This additional requirement ensures the availability of the emergency brake feature and is in accordance with the current available design of high-speed passenger equipment. FRA received comments from Renfe Talgo recommending that FRA change this requirement to permit shorter equipment to provide only one location in each unit of a train with a means to actuate the emergency brake. This commenter recommends such leeway due to the fewer number of passengers in these units and due to the distance any one passenger would be to the actuation device when compared to the distance in standard length passenger train units. FRA has modified this paragraph to provide that equipment that is 45 feet or less in length (approximately one-half the length of standard passenger equipment) need provide a means to actuate the emergency brake at only one location in each such unit of the train.

Paragraph (d) requires the brake system to be designed to prevent thermal damage to wheels and brake discs.

Paragraph (e) contains requirements related to blended braking systems. These requirements are similar to those contained in § 238.231(j). The only additional requirement is that the operational status of the electric portion of the blended brake be displayed in the operator's cab. Operators of this high-speed equipment may use different train handling procedures when the electric portion of blended brake is not available. Therefore, a dangerous situation could arise when an operator of these high-speed trainsets expects the electric portion of the blended brake to be available and it is not. FRA believes that when operations exceed 125 mph either the train must not be used if the electric portion of the blended brake is not available, or the train operator must know that the electric portion of the blended brake is not available so he or she can be prepared to use compensating train handling procedures. Further, FRA believes that if the additional heat input to wheels or discs caused by lack of the electric portion of the blended brake causes thermal damage to these braking surfaces, then the electric portion of the blended brake should be considered a required safety feature and, unless it is available, the equipment should not be used.

Paragraph (f) requires the brake system to allow a disabled train's pneumatic brakes to be controlled by a conventional locomotive during rescue operations.

Paragraph (g) requires that Tier II passenger trains be equipped with an independent brake failure detection system that compares brake commands to brake system outputs to determine if a failure has occurred. This paragraph also requires that the brake failure detection system report failures to the automated monitoring system, which is contained in § 238.445, thus alerting the train operator to potential brake system degradation so that the operator can take corrective action such as slowing the train.

Paragraph (h) requires that all Tier II passenger equipment be provided with an adhesion control system designed to automatically adjust the braking force on each wheel to prevent sliding during braking. This paragraph also requires that the train operator be alerted in the event of a failure of this system with a wheel slide alarm that is visual or audible, or both. This feature ties the adhesion control system to the automated monitoring system and prevents dangerous wheel slide flat conditions that can be caused when wheels lock during braking.

Section 238.433 Draft System

FRA is requiring that leading and trailing automatic couplers of Tier II trains be compatible with standard AAR couplers with no special adapters used. FRA believes that compatibility with standard couplers is necessary in order that a conventional locomotive could assist in the rescue of disabled Tier II passenger equipment. In addition, couplers must include an automatic coupling feature as well as an uncoupling device that complies with 49 U.S.C. chapter 203, 49 CFR part 231, and 49 CFR § 232.2. FRA believes that automatic uncoupling devices are necessary in order to comply with the intent of the statute so that employees will not have to place themselves between equipment in order to perform coupling or uncoupling operations.

Section 238.435 Interior Fittings and Surfaces

This section contains the requirements for interior fittings and surfaces. Once survivable space is ensured by basic vehicle structural strength and crash energy management requirements, the design of interior features becomes an important factor in preventing or mitigating injuries resulting from collisions or derailments. Loose seats, equipment, and luggage are a significant cause of injuries in passenger train collisions and derailments.

Paragraphs (a) through (c) contain requirements for the design of passenger car seats and the strength of their attachment to the car body. These requirements are based on sled tests of passenger coach seats, seat tests conducted for other modes of transportation, and computer modeling to predict the results of passenger train collisions. These provisions include a requirement for shock absorbent material on the backs of seats to cushion the impacts of passengers with the seats ahead of them.

FRA has modified paragraph (a) based on comments received in response to the NPRM. In the NPRM, FRA proposed requiring a seat back in a passenger car to be designed to withstand, with deflection but without total failure, the load of a seat occupant who is a 95th-percentile male accelerated at 8g who impacts the seat back. *See* 62 FR 49819. Simula, in commenting on the NPRM, suggested that the seat back in a passenger car should be designed to withstand, with deflection but without total failure, the impact of unrestrained occupant(s) seated behind the test article (seat back) and subjected to the same crash pulse. Further, in its comments on the NPRM, Bombardier noted that the design of the seats in Amtrak's HTS is based on a 185-pound occupant according to Amtrak's specification, while paragraph (a) specified the occupant size as a 95th-percentile male.

In the final rule, paragraph (a) requires that the design of the seat back

and seat attachment withstand, with deflection but without total failure, the load associated with the impact into the seat back of an unrestrained 95th-percentile adult male initially seated behind the seat, when the floor to which the seat is attached decelerates with a triangular crash pulse having a peak of 8g and a duration of 250 milliseconds. (As used in this section, a 95th-percentile adult male has been defined in § 238.5.) This modification clarifies the intent of the proposal, and specifies a crash pulse. As noted by Simula, specifying a crash pulse recognizes the importance of testing seats dynamically to represent actual conditions in a train collision. Paragraph (a) has also been modified to incorporate paragraph (c)(1) of the proposed rule by stating that the seat attachment must also resist the specified load as well, and this is discussed below.

In response to Bombardier's comment on the size of the occupant seated behind the seat being tested for purposes of determining the required strength of the seat, FRA notes that the specification for Amtrak's HTS does provide for use of a smaller occupant than is specified in the rule. However, the Amtrak specification also provides that the occupant be subjected to a more severe crash pulse than that specified in the rule. As a result, FRA believes that under paragraph (a) the energy required to be absorbed by the seat being tested is not greater than that provided for in the Amtrak specification, and FRA has not modified the rule on this point.

As noted above, FRA has modified paragraph (c) in the final rule by incorporating proposed paragraph (c)(1) into paragraph (a) of the final rule and retaining, as renumbered in paragraph (c) of the final rule, proposed paragraphs (c)(2) and (c)(3) in the NPRM. See 62 FR 49819. FRA has incorporated proposed paragraph (c)(1) into paragraph (a) of the final rule based in part on a comment from Simula that the ultimate strength of a seat attachment to a passenger car body shall be sufficient to withstand a crash pulse representing a typical train accident (275 msec triangular pulse, peak acceleration 10 G) and the impact of an unrestrained occupant(s) behind the test article. Incorporating the longitudinal strength requirement proposed for the seat attachment in paragraph (c)(1) of the NPRM into paragraph (a) of the final rule rationalizes the rule and recognizes that the seat attachment requirement and the seat back requirement both take into account the force of a train occupant impacting the seat from behind. However, FRA has not adopted Simula's recommendation to increase the g loading that the seat attachment is required to withstand or specify a crash pulse as long as 275 milliseconds, triangular. Simula's recommendation appears to be based on the assumption that higher speed train collisions will result in greater decelerations of longer duration in a trailer car. Yet, FRA believes that the resulting decelerations will have only a longer duration. As the duration for which an occupant impacts an interior surface has a negligible influence on potential injury, the 8g force and 250 msec crash pulse specified in this paragraph is appropriate for Tier II passenger equipment.

The lateral and vertical loading requirements in paragraph (c) remain unchanged from the NPRM other than being renumbered.

FRA has not incorporated two other comments from Simula on this section for the reasons noted below. First, Simula suggested adding a requirement that two rows of seats should be included in the seat testing and positioned to represent the row-to-row pitch for installation. FRA has not modified the rule in this regard, because FRA believes it evident that in testing seats to show compliance with the requirements of this section the positioning of the seats must represent the actual positioning of the seats in the passenger car subject to the requirements of this section. In addition, Simula recommended that instrumented Hybrid III dummies be seated in the row behind the test article to determine occupant injury potential during a dynamic test, and that the data measured by the dummies meet specified injury criteria available in a pending APTA standard. Simula further recommended that the number and size of unrestrained occupants (crash test dummies) to be used in testing be defined in the APTA standard. Simula noted that the results of ongoing research will be used to complete the standard, and that to meet injury performance criteria the railroad may have to use some form of occupant restraint system. As evidenced by Simula's comments, specifying occupant injury criteria is an ongoing issue and, as such, is best deferred to the second phase of this rulemaking. FRA does recognize that pursuing the specification of occupant injury criteria is both sound and technically appropriate, and encourages research in this regard for use in the second phase of the rulemaking, in addition to examining the use of NHTSA occupant injury criteria.

Paragraph (d) contains the requirements for strength of attachment of interior fittings and is similar to that required in § 238.233(c). Similar to its comment noted above, Bombardier remarked that proposed paragraph (d) specified a 95th-percentile male for use in determining the required strength of certain interior fittings. *See* 62 FR 49819–20. Bombardier explained that the design of tables for Amtrak's HTS does not follow this approach, and that, based on research conducted within the rail industry, it relates to impact velocities of a 185-pound occupant. Bombardier was unsure how the proposed rule compared to the way tables were being designed and constructed for Amtrak's HTS, and requested that the practicality of the proposed approach be first considered. As FRA responded above to Bombardier's similar comment, FRA believes that specifying a larger occupant size will not in itself increase the strength that the fitting is required to withstand since the Amtrak specification provides that the 185-pound occupant must resist a more severe crash pulse than that provided in the rule. FRA believes the requirement in paragraph (d) is not greater than that required under the Amtrak specification for HTS.

Paragraph (e) contains a special requirement for the ultimate strength of seats and other fittings in the cab of a power car. Due to the extra strength of the cab, its structure is capable of resisting forces caused by accelerations that exceed 10g. As a result, benefit can be gained from a greater longitudinal strength requirement for seat and other interior fitting attachments. FRA is therefore requiring that seats and equipment in the cab be attached to the car body with sufficient strength to resist longitudinal forces caused by an acceleration of 12g. The lateral and vertical requirements remain 4g. These requirements do not apply to equipment located outside the cab.

In its comments on the NPRM, Simula also recommended that the 12g longitudinal requirement be supplemented by a 250-millisecond dynamic crash pulse. However, FRA believes that this will result in a more expensive test without a corresponding increase in safety. Simula further suggested that the 4g lateral and vertical loading requirements apply to the combined mass of the seat and the seat occupant. FRA notes that such a requirement is provided in § 238.447(f)(2).

Paragraphs (f) and (g) contain requirements representing good safety design practice for any type of vehicle.

FRA believes the luggage restraint requirement in paragraph (h) will

prevent many of the injuries caused by flying luggage that are typical of passenger train collisions and derailments.

FRA has included paragraph (i) in the final rule, consistent with its parallel requirement in § 238.233(g) for Tier I passenger equipment.

Section 238.437 Emergency Communication

This section requires an emergency communication system with back-up power within a Tier II train. This safety feature will allow the train crew to provide evacuation and other instructions to passengers, and help prevent panic that can occur during emergency situations.

FRA's principal revision to this section allows passenger cars 45 feet or less in length to have only one emergency communication transmission location. FRA had proposed that transmission locations be placed at both ends of each passenger car. In response to the proposal, Talgo commented that in considering the placement of transmission locations, the operative factor should be the distance from any point on the train to the nearest transmission unit—rather than specifying that they be placed at the ends of each passenger car. Talgo believed this necessary to accommodate cars which are half the length in size of conventional cars.

As the length of a conventional railroad passenger car is typically between 85 and 90 feet, FRA believes it appropriate to require a car not more than half that length to have only one emergency communication transmission unit. However, FRA is not prepared to specify a requirement to place such transmission units solely on the distance from any point on the train to the nearest transmission unit. By taking into account the location of transmission units on a train level, the nearest transmission unit to a passenger seated in one car may in fact be a transmission unit located in an adjoining car. However, having to pass into an adjoining car to access the transmission unit, although nearer linearly, may at a minimum be impracticable in certain situations. FRA believes that each Tier II passenger car, no matter its size, must have its own emergency communication transmission unit.

This section also requires that emergency communication transmission locations be marked with luminescent material, that clear instructions be provided for the use of the emergency communication system, and that the emergency communication system have back-up power for a minimum period of 90 minutes.

In commenting on the rule, the NTSB noted that FRA had not proposed emergency communication requirements for Tier I operations. The NTSB believed that emergency communication requirements are necessary for Tier I operations because the majority of passenger train accidents have occurred in those operations. The NTSB also stated that emergency communication requirements should not be limited to intra-train operations, but include as well the ability to communicate from the train to outside sources. In a similar comment on the NPRM, the UTU stated that passenger trains should not be dispatched without working head end radios and a reliable backup system. The UTU also commented that all conductors and crewmembers should be issued portable radios capable of communicating with each other, the head end, and the dispatcher or control center.

FRA is not applying the Tier II requirements for intra-train emergency communication to Tier I operations at this time. FRA agrees with the NTSB's comment that emergency communication requirements should not be a function of speed, but rather a function of the design and configuration of the train and the terrain in which the train operates. Yet, FRA's decision here is not based on speed. FRA initially proposed to limit this proposal to Tier II passenger trains because such trains are intended to operate as a fixed unit, unlike most Tier I passenger trains. Whereas an emergency system to communicate throughout the train may be more easily provided for in a train which remains as a fixed unit, the interchangeability of passenger cars and locomotives raises practical considerations about the compatibility of communications equipment in a Tier I passenger train. FRA believes it best to address these considerations and further examine requirements concerning emergency communication within a Tier I train in the second phase of the rulemaking, following consideration of these issues by the APTA PRESS Task Force.

As to requirements for emergency communication from a train to an outside source, FRA has addressed such requirements in the Railroad Communications final rule, designated as Docket No. RSOR–12. *See* 63 FR 47182; Sept. 4, 1998. FRA recognizes that the ability to communicate in an emergency is important for all trains—freight and passenger. In particular, because passenger trains operate commingled with freight trains, the ability of a freight train crew to notify a railroad control center of an emergency involving its train may prevent a collision with an oncoming passenger train. The railroad communications rulemaking was supported by a working group, established through RSAC, which specifically addressed communication facilities and procedures, with a strong emphasis on passenger train emergency requirements. In general, section 220.209 of the Railroad Communications final rule provides that, for each railroad having no fewer than 400,000 employee work hours, each occupied controlling locomotive in a train shall have a working radio that can communicate with the control center of the railroad, and each train shall also have communications redundancy, i.e., a working radio on another locomotive in the consist or other means of working wireless communication. *See* 49 CFR § 220.9; 63 FR 47195–6. Moreover, in addition to the requirements of the Railroad Communications rule, FRA notes that intercity passenger and commuter railroads already make extensive provision for ensuring communication capabilities during emergencies. FRA believes that other communications issues have been resolved either in the railroad communications rulemaking, the passenger train emergency preparedness rulemaking, or this final rule. However, any final issues can be addressed in the second phase of this rulemaking.

Section 238.439 Doors

This section contains the requirements for doors on Tier II passenger cars. This section should be read with the discussion of passenger car doors earlier in the preamble. As stated, FRA has modified the requirement for the number of exterior side doors per passenger car (contained in paragraph (a)) by specifying that each car shall have a minimum of two such doors.

The requirements in paragraph (b) are similar to those contained in § 238.235(b) for Tier I passenger equipment. However, the requirements of paragraph (c) have no counterpart in § 238.235. This paragraph requires the status of powered, exterior side doors to be displayed to the crew in the operating cab and, if door interlocks are used, the sensors to detect train motion must nominally be set to operate at not more than 3 mph. Such equipment is well within current technology. Paragraph (d) requires that powered, exterior side doors be connected to an emergency back-up power system.

Paragraph (e) is identical to that provided for Tier I passenger equipment in § 238.235(c).

Paragraph (f) requires passenger compartment end doors to be equipped with a kick-out panel, pop-out window, or other means of egress in the event the doors will not open, or be so designed as to pose a negligible probability of becoming inoperable in the event of carbody distortion following a collision or derailment. This paragraph does not apply to such doors providing access to the exterior of a trainset, however, as in the case of an end door in the last car of a train. In the NPRM, FRA discussed that the requirements in this paragraph originally arose out of the NTSB's emergency safety recommendations following its investigation of the February 16, 1996, collision between a MARC commuter train and an Amtrak passenger train in Silver Spring, Maryland. *See* 62 FR 49734–5. Specifically, as stated in its final railroad accident report, the NTSB recommended that FRA:

> Require all passenger cars to have either removable windows, kick panels, or other suitable means for emergency exiting through the interior and exterior passageway doors where the door could impede passengers exiting in an emergency and take appropriate emergency measures to ensure corrective action until these measures are incorporated into minimum passenger car safety standards. (NTSB/RAR–97/02) (R–97–15)

As explained in the NPRM, FRA proposed that the first practical application of the NTSB's recommendation be made with respect to Tier II passenger car end doors. *See* 62 FR 49735. FRA has been assisting APTA through its PRESS task force examine the full range of options for implementing the NTSB recommendation in Tier I passenger equipment, in addition to the Volpe Center's work on emergency egress on a systems level. These complementary efforts will be brought together in the second phase of the rulemaking.

FRA notes that it has modified paragraph (f) from the proposal in the NPRM, *see* 62 FR 49820 (proposed § 238.441(d)), to permit Tier II passenger car doors to be designed without a kick-out panel, pop-out window, or like feature, provided that the doors pose a negligible probability of becoming inoperable in the event of carbody distortion following a collision or derailment. FRA believes this modification is consistent with the NTSB's safety recommendation (R–97–15).

Paragraph (g) is reserved for door marking and operating instruction requirements. These requirements are currently provided in the rule on passenger train emergency preparedness at 49 CFR § 239.107. See 63 FR 24630, 24680. In phase II of the rulemaking, FRA will consider integrating the door marking and operating instruction requirements found in part 239 with this part. Additionally, FRA will consider revising those requirements as necessary.

Section 238.441 Emergency Roof Entrance Location

This section requires that Tier II passenger equipment either have a roof hatch or a clearly marked structural weak point in the roof to provide quick access for properly equipped emergency personnel. Such features will aid in removing passengers and crewmembers from a vehicle that is either on its side or upright.

In the NPRM, FRA proposed that each Tier II passenger car be equipped with a minimum of two such emergency roof entrance locations. *See* 62 FR 49820. Talgo, in its comments on this proposal, remarked that a passenger car half the length of a conventional passenger car should require only one roof hatch or structural weak point. Further, Bombardier commented that the high-speed trainsets it is constructing for Amtrak will have only one structural weak point located in the center of the passenger cars due to the location of roof-mounted air conditioning units at each end of the cars.

In the final rule, each Tier II passenger car and each cab of a power car is required to have at least one emergency roof entrance location to permit the evacuation of the vehicle's occupants through the roof. Beyond the issue of the sufficiency of the number of emergency roof entrance locations for Tier II passenger equipment is the larger issue of applying requirements for emergency roof entrance locations to Tier I passenger equipment. The final rule does not contain such requirements for Tier I passenger equipment, and there was no consensus within the Working Group to do so. *See* 62 FR 49750–1. However, FRA believes that work within the APTA PRESS Task Force will lead to reconciliation of Tier I and Tier II requirements on this issue. FRA intends to reexamine the requirements of this section in the second phase of the rulemaking with a view to applying emergency roof entrance locations requirements to Tier I passenger equipment. In the meantime, the public is entitled to the protection afforded by the Tier II standard. High-speed derailments may be more severe because of the total energy involved and a potentially longer ''ride down'' during which injuries may occur, rendering occupants incapable of exiting the train under their own power.

Paragraph (b) is reserved for marking and instruction requirements to be specified as necessary in the second phase of this rulemaking.

Section 238.443 Headlights

FRA received no comments on this provision, and it is adopted as proposed. Because of the high speeds at which Tier II passenger equipment operates, FRA is requiring that a headlight be directed farther in front of the train to illuminate a person than is currently required for existing equipment under 49 CFR § 229.125(a). A Tier II passenger train will travel distances more quickly than a Tier I passenger train, and the train operator will have less time to react, thereby necessitating earlier awareness of objects on the track.

FRA notes that, as further specified in 49 CFR § 229.125(d)–(h), locomotives operated at speeds greater than 20 miles per hour over one or more public highway-rail crossings are required to be equipped with operative auxiliary lights. The requirements contained in § 229.125(d)–(h) do apply, according to their terms, to Tier II passenger equipment. Any proposal to the contrary in the NPRM was made in error.

Section 238.445 Automated Monitoring

This section contains the requirements related to the automated monitoring of the status or performance of various safety-related systems on Tier II passenger trains. A number of passenger train accidents have been either fully or partly caused by human error. The faster operating speeds of Tier II passenger equipment will afford the train operator less time to evaluate and react to potentially dangerous situations, thereby increasing the potential for accidents. Automated monitoring systems can decrease the risk of accidents by alerting the train operator to abnormal conditions and advising the operator as to necessary corrective action. Such systems can even be designed to take corrective action automatically in certain situations.

FRA received no comments on this section as proposed, and paragraphs (a) and (c) have been adopted without substantive change. However, FRA has modified paragraph (b) to make clear when immediate corrective action must be taken in the event a system or component required to be monitored is

operating outside of its predetermined safety limits.

Paragraph (a) requires a Tier II passenger train to be equipped to monitor the performance of a minimum set of safety-related systems and components. The monitoring system can also be used to provide information for trouble-shooting and maintenance and to accumulate reliability data to form the basis for setting required periodic maintenance intervals.

Paragraph (b) requires the train operator to be alerted when any of the systems or components required to be monitored is operating outside of predetermined safety parameters. When any such system or component is operating outside of its predetermined safety parameters, immediate corrective action must be taken if the system or component defect impairs the train operator's ability to safely operate the train. Accordingly, a report of a system or component defect may not require immediate corrective action. The need to take such action would be determined by the railroad based on whether the defective system or component impairs the train operator's ability to safely operate the train. Further, in the event immediate corrective action must be taken, the rule does not require that intervention be automatic. Of course, the railroad should have a valid basis for either leaving response in the hands of the train operator or making the corrective action automatic.

Paragraph (c) requires the monitoring system to be designed with an automatic self-test feature that notifies the train operator that the monitoring capability is functioning correctly and alerts the operator that a system failure has occurred. Because train operators can become dependent on automated monitoring systems, they need to know when their vigilance must be heightened to compensate for a malfunction in such an automated safety tool.

Section 238.447 Train Operator's Controls and Power Car Cab Layout

This section contains a set of requirements for interior features in Tier II power car cabs. FRA has clarified and revised this section, based on comments received in response to the proposal, in two principal ways: The seat requirements in paragraph (f) apply to any floor-mounted seat and each seat provided for an employee regularly assigned to occupy the power car cab, instead of to each crewmember in the cab; and such seats will not require seatbelts. FRA has also combined proposed paragraphs § 238.447(a) and (b) in the NPRM, *see* 62 FR 49820–1, into paragraph (a) of this section in the final rule for economies of space. Subsequent paragraphs have been renumbered accordingly.

In its comments on the NPRM, Bombardier explained that an additional seat—commonly a flip-up or a shelf-type seat—is in many cases provided in the cab for a train crewmember who is not normally in the cab. Bombardier believed these seats should not be subjected to the same requirements as for the train operators' seats, as that was not the intent of discussions within the Working Group. Accordingly, Bombardier recommended making clear that the requirements in paragraph (f) apply only to each seat provided for the train operators.

FRA agrees with Bombardier's comment that the requirements proposed in § 238.447(g) of the NPRMBnow § 238.447(f) of the final rule—need not apply to each seat provided for a crewmember in a power car cab. FRA recognizes that flip-down and other auxiliary seats are provided in locomotive cabs for the temporary use of employees not regularly assigned to the cab. These employees may include a supervisor of locomotive engineers conducting an operational monitoring test of the engineer(s). Such seats are typically attached to an interior wall and placed behind those seats used by the train operators. FRA believes it appropriate to clarify the application of paragraph (f) in the final rule so that its requirements apply only to each seat provided for an employee regularly assigned to occupy the power car cab, and to any floor-mounted seat in the cab. Accordingly, paragraph (f) does not apply to a wall-mounted, flip-down seat occupied by an employee such as a supervisor of locomotive engineers who occasionally rides in the cab.

FRA has also modified paragraph (f) by not requiring that seats subject to that provision be equipped with a single-acting, quick-release lap belt and shoulder harness as defined in 49 CFR § 571.209. FRA had proposed such a requirement in the NPRM because the crew may experience high decelerations in a collision from the cab's high strength and forward location near the expected point of impact in many different collision scenarios. *See* § 238.447(g)(1), 62 FR 49821. In its comments on the NPRM, the BLE stated that its experience did not support the need to require a lap belt and shoulder harness, and that its member engineers were overwhelmingly against such a requirement. The BLE explained that engineers need to rapidly exit from the seat to a place of safety in the event of an impending accident or act of vandalism. In such instances, the primary defense of the engineer is to move quickly from harms way, according to the BLE, and operating at speeds of 150 mph will decrease the time a locomotive engineer has to react to such incidents. The BLE noted that it would change its position on this issue if there is overwhelming evidence that the force of deceleration on Tier II equipment would be so severe as to cause injury to engineers or interfere with their operation.

In its comments on the rule, Simula remarked that formal research is needed to determine both the feasibility of incorporating active restraints in a cab and the potential for the crew to actually use them. Simula also noted the option of exploring passive restraints such as air bags or compartmentalization, as opposed to active restraints such as lap belts and shoulder harnesses. Simula explained that cost effectiveness considerations for implementing both compartmentalization and active and passive restraints are markedly different for the crew in the cab compared to passengers. Simula asserted that the relatively high cost of passive restraints may be justified for one or two crewmembers in a extremely severe environment.

In light of the comments received, FRA has decided to defer until Phase II of the rulemaking the issue of requiring seats in a power car cab to be equipped with seat belts and shoulder harnesses. FRA will continue to explore strategies for train occupant protection—both for passengers and employees—and FRA will be able to focus on these strategies with the members of the Working Group in Phase II.

In other statements on the NPRM, commenters recommended applying the requirements in this section to Tier I passenger equipment. The NTSB stated that the minimum elements proposed in this section for operator's controls and cab layout design are sufficient and should also be included in Tier I operations for ergonomic design and to minimize the chance of human error in both types of operations. The NTSB cited safety recommendations arising out of an accident in Kelso, California, concerning the dangers posed by improperly located safety-significant controls and switches in locomotives and the need to relocate and/or protect such controls and switches so they cannot be inadvertently activated or deactivated. FRA has not fully explored extension of these concepts with the working group and will take the issue under advisement for incorporation into

Tier I standards during Phase II of the rulemaking.

The BLE commented that the proposed requirements for seating in this section also be applied to Tier I equipment. The BLE stated that existing seating on some Tier I equipment is woefully inadequate. In particular, the BLE noted that some cab car seats are not adjustable; have no suspension; are severely limited in their cushioning; have no lumbar support; and are injuring their occupants. The BLE also recommended that both Tier I and Tier II equipment be provided with a cab temperature control system which maintains a minimum temperature of 65 degrees and a maximum of 85 degrees F.

FRA in not requiring that the detailed provisions in this section be imposed in full on Tier I passenger equipment. FRA believes these provisions are more necessary for Tier II passenger equipment because the higher operating speeds will press human reaction time, and such requirements will contribute to the ability of the crew to operate the train as safely as possible. In addition, several members of the Working Group opposed applying such requirements to Tier I passenger equipment, asserting that a number of the requirements involved ergonomic issues which do not directly affect safety. FRA notes that certain requirements concerning locomotive cab interior safety are provided in § 238.233 of the final rule.

Through RSAC's working group on Locomotive Cab Working Conditions, FRA and members of the regulated community have been evaluating issues concerning locomotive cab working conditions. As a number of issues concern both passenger and freight operations, FRA believes that such issues may best be addressed in this RSAC working group. Of course, FRA does recognize that the concern involving crew seats in cab cars is more unique to passenger operations, and FRA is therefore pleased by APTA's voluntary effort to improve crew seats on cab cars.

FRA notes that, for purposes of paragraph (f)(1) in this section, it has specified the crewmember occupying the seat as a 95th-percentile adult male, consistent with the use of a 95th-percentile adult male elsewhere in this rule. In the NPRM, the characteristics of the crewmember occupying the seat had not been specified, *per se*. *See* proposed § 238.447(g)(2); 62 FR 49821.

FRA further notes that, for purposes of paragraph (f)(2), it has not specified particular measurements or a particular survey on which to base the necessary characteristics of persons ranging from a 5th-percentile adult female to a 95th-percentile adult male. Instead, these characteristics may be drawn from any recognized survey after 1958 of weight, height, and other body dimensions of U.S. adults, corrected for clothing as appropriate. Data from such a survey is presented in Public Health Service Publication No. 1000, Series 11, No. 8, ''Weight, Height, and Selected Body Dimensions of Adults,'' June 1965. (A copy of this document has been placed in the public docket for this rulemaking.) The definition of 95th-percentile adult male used elsewhere in the rule is too narrow to apply in this context.

Subpart F—Inspection, Testing, and Maintenance Requirements for Tier II Passenger Equipment

Section 238.501 Scope

This subpart contains the inspection, testing, and maintenance requirements for passenger equipment that operates at speeds exceeding 125 mph but not exceeding 150 mph. As discussed in the 1997 NPRM, there is currently no operating history with regard to Tier II equipment, and thus there are no regulations or industry standards establishing detailed testing, inspection, or maintenance procedures, criteria, and intervals for the equipment. The railroads and the rail labor organizations differ on the approach that should be taken in establishing inspection, testing, and maintenance requirements. Railroads have long appealed to FRA to move away from detailed ''command and control'' regulations and instead to provide broad safety performance requirements that afford railroads wide latitude to develop the operational details. Rail labor organizations, on the other hand, believe that specific inspection, testing, and maintenance criteria that cannot be unilaterally changed by railroads are the only way that safe railroad operation can be assured.

FRA believes that the introduction of a new type of passenger equipment offers the opportunity for a fresh start, where perhaps both of these seemingly conflicting concerns can be resolved. This final rule retains the approach taken in the 1997 NPRM and contains general guidelines on the process to be used by the operating railroad, together with the system developer, to develop an inspection, testing, and maintenance program. The operating railroad and the system developer together have the best information, expertise, and resources necessary to develop the details of an effective inspection, testing, and maintenance program. The operating railroad is thereby granted some latitude to develop the operational details of the program, using the system safety process to justify the safety decisions that are made. However, FRA intends to exercise final approval of the inspection, testing, and maintenance program proposed by the operating railroad; rail labor organizations will be given an opportunity to discuss their concerns with FRA during the approval process set forth in § 238.505. Tier II equipment may not be used prior to FRA approval of an inspection, testing, and maintenance program. Further, this final rule makes clear that FRA intends to enforce the safety-critical inspection, testing, and maintenance procedures, criteria, and maintenance intervals that result from the approval process.

Labor commenters recommended that if FRA is to permit the railroads to develop inspection and testing criteria and procedures for Tier II passenger equipment, then rail labor must be involved in the process as a full partner. These commenters also believed that any procedures developed must provide an equivalent level of safety to the inspection and testing procedures provided for conventional passenger equipment. Furthermore, these commenters believed that any testing and inspection procedures developed must be fully enforceable to the same extent as federal regulations.

Although FRA recognizes and appreciates labor's desire to be a full partner in the development of any inspection and testing procedures, and FRA fully endorses and recommends collaboration with appropriate labor forces, FRA does not believe it appropriate to mandate labor's participation in the initial stages of the development of such procedures. As the equipment for which the inspection and testing programs are being developed will be new, with little operating history, FRA believes that the operating railroad and the system developer have the best information, expertise, and resources necessary to develop the details of an effective inspection, testing, and maintenance program. Moreover, FRA believes this final rule provides the industry's labor forces with an adequate avenue for raising any issues and providing input on any criteria or procedure developed by a railroad. Section 238.505 ensures that designated representatives of a railroad's employees are provided a copy of any inspection, testing, and maintenance criteria or procedures submitted by the railroad for FRA approval and provides an opportunity for these parties to present their views on the submitted plans and procedures

prior to FRA's approval or rejection of any program. Furthermore, this section addresses all of the major inspections and test provisions related to conventional passenger equipment and ensures that any program developed by a railroad regarding the inspection, testing, and maintenance of Tier II passenger equipment incorporate these major requirements. Finally, paragraph (b) of this section, as discussed in detail below, makes clear that the provisions of any program approved by FRA related to the inspection and testing of power brakes or other inspection, test, or maintenance procedure, criteria, and interval that is deemed to be safety-critical will be enforceable to the same extent as any other requirement contained in this part.

Section 238.503 Inspection, Testing, and Maintenance Requirements

This section requires the establishment by the railroad of an FRA-approved inspection, testing, and maintenance program based on a daily complete brake system test and mechanical safety inspection of the equipment performed by qualified maintenance persons, coupled with a periodic maintenance program based on a system safety analysis. Although paragraph (a) contains some basic requirements to be included in a program, FRA does not intend to prescribe every detail of what a program must contain. FRA requires the operating railroad to develop and justify the details of any program it adopts based on the specific safety needs and operating environment of the high-speed rail system being developed.

Paragraph (b) intends to make enforceable, subject to civil penalties and other enforcement action, the inspection and testing of power brakes and the other safety-critical inspection, testing, and maintenance requirements that are identified in the railroad's program and approved by FRA. ''Safety-critical'' requirements are those that, if not fulfilled, increase ''the risk of damage to equipment or personal injury to a passenger, crewmember, or other person.'' *See* § 238.5. Under paragraph (l), the railroad must identify which items in its inspection, testing, and maintenance program are safety-critical. The railroad must submit the program to FRA under the procedures contained in § 238.505. Once these programs are approved by FRA, this section makes clear those items identified as safety-critical are enforceable by FRA. FRA agrees with labor representatives to the Working Group that safety standards are stronger when they contain specific provisions that can be enforced.

Paragraph (c) requires that the operating railroad develop an inspection, testing, and maintenance program to ensure that all systems and components of Tier II passenger equipment are free of general conditions that endanger the safety of the crew, passengers, or equipment. FRA has identified the various conditions enumerated in paragraph (c) that would need to be addressed in the railroad's program. Consequently, FRA has defined what the inspection, testing, and maintenance program must accomplish, but not how to accomplish it.

Paragraph (d) contains the more specific requirements that any inspection, testing, and maintenance program must incorporate. In paragraph (d)(1), FRA requires that Tier II equipment receive the equivalent of a Class I brake test, as described in § 238.313, before its departure from an originating terminal and every 1,500 miles after that or once each calendar day the equipment remains in service. The test must be performed by a qualified maintenance person. For example, a Tier II train must receive the equivalent of a Class I brake test at its originating terminal and must receive a second Class I equivalent brake test after traveling 1,500 miles from the time of the original Class I brake test, whether or not it is the same calendar day. Furthermore, a Tier II train must receive the equivalent of a Class I brake test each calendar day it is used in service even if it has not traveled 1,500 miles since the last Class I equivalent brake test. Due to the speeds at which this equipment is permitted to operate, FRA believes that a comprehensive brake test must be performed prior to the equipment being placed in service.

Paragraph (d)(2) requires that a complete exterior and interior mechanical inspection be conducted by a qualified maintenance person at least once each calendar day that the equipment is used. In order to perform a quality mechanical inspection, railroads must be provided some flexibility in determining the locations where these inspections can best be performed. FRA believes that permitting railroads to conduct these mechanical inspections at any time during the calendar day provides adequate flexibility to move equipment to appropriate locations. Trains that miss a scheduled Class I brake test or mechanical inspection due to a delay en route may proceed to the location where the Class I brake test or mechanical inspection was scheduled to be performed. FRA recognizes that, due to the specialized nature of this equipment, proper inspections can only be conducted at a limited number of locations. FRA also recognizes that trains become delayed en route due to problems which are not readily foreseeable. Thus, FRA will permit the continued use of such equipment to the location where the required inspection was scheduled to be performed.

Paragraph (e) restates § 238.15 and provides a cross-reference to that section. The paragraph provides that trains developing en route defective, inoperative, or insecure primary brake equipment be moved in accordance with the requirements of that section.

Paragraph (f) restates § 238.17 and adds a narrow exception to that section. The paragraph requires that Tier II equipment that develops a defective condition not related to the primary brake be moved and handled in accordance with the requirements contained in § 238.17, with one exception. The exception to these requirements applies to a failure of the secondary portion of the brake that occurs en route. In those circumstances, the train may proceed to the next scheduled equivalent Class I brake test at a speed no greater than the maximum safe operating speed demonstrated through analysis and testing for braking with the friction brake alone. At that location the brake system shall be restored to 100 percent operation before the train continues in service. This final rule allows extensive flexibility for the movement of equipment with defective brakes, but also contains a hard requirement that all brake components be repaired and the brake system, including secondary brakes, be restored at the location of the train's next major brake test. FRA believes that this approach recognizes the secondary role played by the electric portion of blended brakes. If the railroad has demonstrated that the friction brake alone can stop the train within signal spacing without thermal damage to braking surfaces, then the train may be used at normal maximum speed in the event of an electric brake failure. This final rule essentially limits the use of trains without available secondary braking systems to no more than 48 hours. FRA believes that § 238.17 strikes the correct balance between the need of railroads to transport passengers to their destination and the need to have equipment with defects that could lead to more serious safety problems quickly repaired. This requirement places a heavy responsibility on qualified maintenance persons to exercise their judgment on when and how equipment is safe to move.

Paragraph (g) requires that scheduled maintenance intervals be based on the analysis conducted pursuant to the railroad's safety plan, and be approved by FRA under the procedures of § 238.505. The rule allows the maintenance intervals for safety-critical components to be changed only when justified by accumulated acceptable operating data. Changes in maintenance cycles of safety-critical components must be based on verifiable data made available to all interested parties and shall be reviewed by FRA. This paragraph is another attempt to balance the needs of the operating railroad to run efficiently and the concern of rail labor organizations that railroads not have the ability to unilaterally make safety decisions. For a new system, with no operating history, a formal system safety analysis is the only justifiable way to set initial maintenance intervals. The paragraph recognizes that as time passes and an operating history is developed, a basis for changing maintenance intervals can be established. However, the decision to make these changes must have the participation of all the affected parties.

Paragraph (h) requires that the operating railroad establish a training, qualification, and designation program as defined in the training program plan under § 238.109 to qualify individuals to perform safety inspections, tests, and maintenance on the equipment. If the railroad deems it safety-critical, then only qualified individuals may perform the safety inspection, test, or maintenance of the equipment. This paragraph does not prescribe a detailed training program or qualification and designation process. Those details are left to the operating railroad, but FRA must approve the program proposed by the operating railroad under procedures contained in § 238.505.

Paragraph (i) requires the operating railroad to establish standard procedures for performing all safety-critical inspections, tests, maintenance, or repair. This paragraph also makes clear that the inspection, testing, and maintenance program required by this section should not include procedures to address employee working conditions that arise in the course of conducting the inspections, tests, and maintenance set forth in the program. FRA intends for the program required by this section to detail only those tasks required to be performed in order to conduct the inspections, tests, and maintenance necessary to ensure that the equipment is in safe and proper condition for use. In proposing the creation of these plans, FRA did not intend to enter into the area of addressing employee safety while conducting the inspections, tests, and maintenance covered by the programs. FRA is always concerned with the safety of employees while conducting their duties, but employee safety in maintenance and servicing areas generally falls within the jurisdiction of OSHA. It is not FRA's intent to oust OSHA's jurisdiction with regard to the safety of employees while performing the inspections, tests and maintenance required by this part, except where FRA has already addressed workplace safety issues, such as blue signal protection. Therefore, in order to prevent any uncertainty as to FRAs intent, FRA has modified this paragraph by eliminating any language or provision which could have been potentially perceived as displacing the jurisdiction of OSHA and has added a specific clarification that FRA does not intend for the program required by this section to address employee safety while conducting the inspections and tests described. Consequently, the specific elements that FRA proposed to be included in the inspection, testing, and maintenance plan have been eliminated for the reasons noted above and because they were merely duplicative of the general requirements contained in paragraph (a) of this section and are unnecessary.

Paragraph (k) requires that the operating railroad establish an inspection, testing, and maintenance quality control program enforced by railroad or contractor supervisors. In essence, this creates the need for the operating railroad to perform spot checks of the work performed by its employee and contract equipment maintainers to ensure that the work is performed in accordance with established procedures and Federal requirements. FRA believes this is an important management function that has a history of being neglected in the railroad industry.

Paragraph (l) requires the operating railroad to identify each inspection and testing procedure and criterion and each maintenance interval that the railroad considers safety-critical.

Section 238.505 Program Approval Procedure

This section contains the procedures a railroad shall follow in securing FRA approval of its inspection, testing, and maintenance program for Tier II passenger equipment. As no substantive adverse comments were received on this section, FRA has retained this section as proposed in the 1997 NPRM.

Subpart G—Specific Safety Planning Requirements for Tier II Passenger Equipment

Section 238.601 Scope

This subpart contains specific requirements for Tier II passenger equipment safety planning. These safety planning requirements include requirements for the operation of Tier II passenger equipment, procurement of Tier II passenger equipment, and the introduction or major upgrade of new technology in existing Tier II passenger equipment that affects a safety system on such equipment.

The discussion of this subpart should be read in conjunction with the general discussion of safety planning earlier in the preamble. FRA is retaining more extensive safety planning requirements for Tier II railroad operations, as these will be operations with new characteristics that require special attention and have heightened safety risks due to the speed of the equipment.

Section 238.603 Safety Planning Requirements

Paragraph (a) requires that, prior to commencing revenue service operation of Tier II passenger equipment, each railroad shall prepare and execute a written plan for the safe operation of such equipment. The plan may be combined with a pre-revenue service acceptance testing plan required under § 238.111, and any other plan required under this part provided that the individual planning elements required under this part are addressed. The plan shall be updated at least every 365 days.

Paragraph (b) requires that for each procurement of Tier II passenger equipment, and for each major upgrade or introduction of new technology in existing Tier II passenger equipment that affects a safety system on such equipment, each railroad shall prepare and execute a written safety plan. The plan may also be combined with a pre-revenue service acceptance testing plan required under § 238.111, and any other plan required under this part provided that the individual planning elements required under this part are addressed.

As noted earlier in the preamble, Bombardier, in its comments on the NPRM, believed that the proposed rule confused the requirements for a railroad's system safety plan with those required for equipment acquisition. Bombardier recommended that they be separately addressed. This section in the final rule reflects these comments in that paragraph (a) addresses requirements for an overall safety plan for Tier II passenger equipment, while paragraph (b) addresses planning

requirements for equipment acquisition and upgrade.

Paragraph (c) requires that each railroad maintain sufficient documentation to demonstrate how the operation and design of its Tier II passenger equipment complies with safety requirements or, as appropriate, addresses safety requirements under paragraphs (a)(4) and (b)(7) of this section. Each railroad shall also maintain sufficient documentation to track how safety issues are raised and resolved.

Paragraph (d) requires that each railroad make available to FRA for inspection and copying upon request each safety plan required by this section and any documentation required pursuant to such plan. This section does not in itself require FRA approval of a plan. However, FRA approval would be required for those sections of a plan intended to comply with the requirements of § 238.111, for example.

Appendix A—Schedule of Civil Penalties

This appendix contains a schedule of civil penalties to be used in connection with this part. Because such penalty schedules are statements of policy, notice and comment are not required prior to their issuance. *See* 5 U.S.C. 553(b)(3)(A). Commenters were invited to submit suggestions to FRA describing the types of actions or omissions under each regulatory section that would subject a person to the assessment of a civil penalty. Commenters were also invited to recommend what penalties may be appropriate, based upon the relative seriousness of each type of violation. FRA received no specific comments in response.

Appendix B—Test Methods and Performance Criteria for the Flammability and Smoke Emission Characteristics of Materials Used in Passenger Cars and Locomotive Cabs

The table of test methods and performance criteria contained in Appendix B has been revised to address concerns related to their adoption as a regulation. These revisions include reorganization of categories and function of materials listed in the table in Appendix B; inclusion of a note to permit the substitution of seat and mattress assembly tests for individual material tests; inclusion of a note to require dynamic tests to be performed for seat cushions prior to fire tests; revision of performance criteria for certain materials; inclusion of a note to permit a testing exception for small parts; inclusion of a note to permit the use of an alternative heat release rate and smoke generation test for small miscellaneous, discontinuous parts; and addition of a category for wire and cable insulation requirements. Three definitions which relate to heat release rate were added to those previously listed in Appendix B of the NPRM. A new category of structural components other than structural flooring which may be exposed to fire hazards and associated notes was also added. The complete list of notes has also been renumbered from that contained in the NPRM to reflect these revisions.

The revisions were selected based on the results of analysis of input from several resources. (A detailed rationale for all revisions is also contained in a supporting document prepared under contract to the Volpe Center and placed in the public docket for this rulemaking.[6]) First, the comments of the parties who responded to the NPRM were reviewed. As raised in particular by Fire Cause Analysis in its comments on the NPRM, the current classification of items listed in the categories and functions in the table contained in Appendix B in the NPRM (based on FRA's 1989 guidelines) has caused confusion and conflict as to what materials should be tested according to what test methods. Second, a document containing the rationale for the development of the original flammability and smoke emission tests and performance criteria was reviewed.[7] Third, the previous **Federal Register** notices pertaining to tests and performance criteria published as the 1989 FRA guidelines (54 FR 1837; Jan 17, 1989) and published as recommended practices by FTA (then-UMTA) for rail transit vehicles (47 FR 53559, Nov. 26, 1982; 49 FR 32482, Aug. 14, 1984) and for transit buses and vans (55 FR 27402, July 2, 1990; 57 FR 1360, Jan 13, 1992; 58 FR 54250, Oct. 20, 1993) were reviewed. Fourth, the input from railroad operators, carbuilders, and consultants who participated in a Workshop held at the NIST Building and Fire Research Laboratory in July 1997 was considered.[8] Fifth, documentation prepared by the NFPA Railroad Task Force for the NFPA 130 Committee was reviewed.[9,10] Sixth, the results of the ongoing FRA-sponsored NIST fire safety research project were reviewed; as well as the results of tests jointly funded by Amtrak and FRA using alternative seat assemblies considered for use in Amtrak's high-speed trainsets. Seventh, the results of the NTSB-sponsored fire tests conducted for MARC commuter rail cars were reviewed.[11] All of these inputs and further analysis were used as the basis to simplify the table in Appendix B of the NPRM and reduce confusion and duplication in revising the list of tests and performance criteria and related notes.

Most of the items listed under ''Function of Material'' in the table in Appendix B of the NPRM have identical (or nearly identical) flammability pass/fail performance criteria. For example, although they were listed separately in the NPRM under function of material in the table, ''Seat and/or Mattress Frame''; ''Seat and Toilet Shroud''; ''Wall''; ''Ceiling''; ''Windscreen''; ''Partition, Tables and Shelves''; ''HVAC Ducting''; ''Window''; ''Light Diffuser''; ''End Cap [and] Roof Housings''; and ''Interior [and] Exterior Boxes'' all were subject to the same ASTM E 162 test procedure and performance criteria for flame spread. Accordingly, in the final rule, all of these items have been combined under the single category of ''Vehicle Components'' in the table in Appendix B. Overall, the items listed under ''Category'' and ''Function of Material'' have been decreased from seven to six and from twenty-eight to ten, respectively, from the same table in the NPRM. The majority of entries have also been re-titled. The new ''Category'' and ''Function of Material'' titles streamline the table presentation while retaining all the actual material functions used in an intercity or commuter rail passenger car

[6] ''Recommendations for Revising the Fire Safety Performance Requirements in Federal Railroad Administration Notice of Proposed Rulemaking (NPRM) For Passenger Equipment, September 23, 1997,'' Prepared by J. Zicherman and S. Markos. Draft Project Memorandum. December, 1998.

[7] ''Rationale for Recommended Fire Safety Practices for Rail Transit Materials Section.'' Transportation Systems Center. Report nos: MA–06–0098–82–1, and DOT–TSC–UMTA 81–74, January, 1983. A copy of this document has been placed in the public docket for this rulemaking.

[8] ''Follow-UP Notes: NIST/CFR FRA Project, Meeting/Workshop of 7/23/97,''above.

[9] ''Proposed Revision of NFPA 130, Table 4–2.4, Recommendations for Testing the Flammability and Smoke Emission Characteristics of Rail Transit Vehicle Materials; Review Paper—Status Update.'' NFPA 130 Press Working Group Meeting of 8/15/97. Prepared by J. Zicherman. A copy of this document has been placed in the public docket for this rulemaking.

[10] ''Proposed Revision of NFPA 130 Table 4–2.4, Recommendations for Testing the Flammability and Smoke Emission Characteristics of Rail Transit Vehicle Materials; Review Paper—Status Update.'' NFPA 130 Press Working Group Meeting of 10/15/97. Prepared by J. Zicherman. A copy of this document has been placed in the public docket for this rulemaking.

[11] ''Interpretive Report: Flammability and Smoke Compliance and Fire Analysis (MARC/Amtrak Collision, February 16, 1996).'' Prepared for National Transportation Safety Board. Prepared by J. G. Quintiere, University of Maryland. Final Report. December 19, 1996. A copy of this document has been placed in the public for this rulemaking.

or locomotive cab. Some revisions have also been made to acknowledge that certain existing performance criteria are so close as to be indistinguishable based on the precision of the test methods used (*e.g.*, flame spread values of 25 vs. 35 using test procedure ASTM E 162). Of course, some material categories or subcategories could not be combined since they require different test methods, *e.g.*, fabrics versus cushions. In addition, other considerations (such as ballistic test requirements for plastic window glazing) have precluded the combination of (and thus identical performance criteria for) some categories and material functions.

Specific revisions to the table in Appendix B of the NPRM are summarized in the following text. In addition, the notes to the table have been revised and renumbered to reflect the table's reorganization, and the text for several new notes has been added. The notes to the table will be discussed where appropriate in the discussion of the table below, and a discussion of the complete list of notes is also provided.

''Cushions, Mattresses'' is a new category in the table which was formerly listed under the function of material column and included under the previously used category ''Passenger seats, Sleeping and dining car components.'' *See* 62 FR 49823. Note 1 to the table which concerns flaming dripping or running is virtually identical to Note 1 as proposed in the NPRM. Note 2 is virtually identical to Note 5 as proposed in the NPRM, and pertains to ASTM E 662 smoke emission limits. The note renumbering provides consecutive numbering logic within the revised categories and function of materials.

As explained, FRA has been investigating the testing of assemblies of materials for performance in a fire, rather than individually testing the materials which comprise such assemblies, to more accurately reflect the interaction of materials in a fire. As part of the FRA-sponsored fire safety research program managed by the Volpe Center, six full-scale alternative seat assemblies being considered for the Amtrak high-speed train sets were tested in March, 1997, using a furniture calorimeter (ASTM E 1537).[12] The tests, jointly funded by FRA and Amtrak, used current Amtrak upholstery and different cushion foams; fire blocking layers were used in some trials. The test results showed that fire blocking layers can significantly prevent fire ignition, and limit flame spread, fire growth, and smoke generation.

Note 3 permits the testing of seat and mattress assemblies incorporating heat release rate methods developed by consensus. Testing the performance of a seat or mattress assembly as an integrated unit, which is more representative of an actual condition, will be an alternative to individually testing the components that comprise the seat or mattress assembly. Seat assemblies and mattresses to be tested in this alternative manner shall use ASTM E 1537, ''Standard Test Method for Fire Testing of Upholstered Seating Furniture,'' and shall use pass/fail criteria specified in California Technical Bulletin (CAL TB) 133, ''Flammability Test Procedure for Seating Furniture for Use in Public Occupancies.'' CAL TB 133 has a successful history of use at state and municipal levels for high-hazard occupied places, such as nursing homes. Results of the March, 1997 tests using the ASTM E 1537 test procedure on seat assemblies being considered for Amtrak's high-speed trainsets showed that certain assemblies met the Cal TB 133 test criteria and exhibited a total lack of flame spread as well as low heat and smoke release. *Id*. In addition, data from Amtrak-funded tests showed that seat assemblies selected for use on Amtrak's high-speed trainsets passed both the ASTM D 3675 and FAA ''oil burner'' tests.

Acceptance of results using the alternative test approach in Note 3 for seat and mattress assemblies requires an accompanying fire hazard analysis for the specific application. This analysis may take the form of a specific system safety or fire protection analysis. The analysis must provide for necessary quality control of components used in these assemblies in actual day-to-day use. Quality control must be part of the daily operating plans for a system to ensure that individual substandard materials or components are not substituted within a given component assembly for parts having an identical function which are of acceptable quality. In conducting the fire hazard analysis, the operating environment within which seat and mattress assemblies qualified by assembly tests will be used must also be considered in relation to the risk of vandalism, puncture, cutting, or other acts or external forces which may expose the individual components of the assemblies. Seats and mattresses using certain types of foams must resist vandalism, puncture, cutting, and other acts and external forces. Robust blocking layer(s), resistant to both fire (as used to meet FAA fire seat regulations), as well as to cutting and puncture, may be required. If used, these blocking layers must be applied in a manner which seals the seams (*e.g.*, using bonding or ceramic thread with binding tape) and ensures that the foam does not leak or drip out and become exposed to ignition. The U.S. Coast Guard has issued a Navigation and Vessel Inspection Circular (NAVIC) for structural fire protection which permits the use of fire blockers if tested according to Cal TB 133; the NAVIC states that these materials have proven effective in protecting combustible foams from being involved in a fire.[13]

FRA notes that the ASTM E 1537 test procedure was not expressly referenced in the NPRM to allow testing of seat and mattress assemblies in this alternative manner. However, FRA did intend to permit use of alternative test procedures to demonstrate flammability and smoke emission characteristics of materials (upon special approval by FRA). *See* 62 FR 49803. FRA has, in effect, granted approval to any party to use the ASTM E 1537 test procedure to demonstrate the flammability and smoke emission characteristics of seat and mattress assemblies in accordance with the requirements of Note 3, in lieu of utilizing the testing methods otherwise required by the table in Appendix B.

Note 4 applies to seat cushion testing without upholstery and is identical to Note 9 as proposed in the NPRM. The note renumbering provides consecutive numbering logic within the revised categories and function of materials.

Note 5 requires the dynamic testing of seat cushions to address the retention of fire retardant characteristics of foams after the materials have been in service for a period of time. The precedent for the addition of Note 5 requiring the performance of an endurance test (ASTM D 3574, Test I_2 (Dynamic Fatigue Test by the Roller Shear at Constant Force) or Test I_3 (Dynamic Fatigue Test by Constant Force Pounding) both using Procedure B) for seat cushions is noted in the FTA notices relating to transit bus and van materials (58 FR 54250, 57 FR 1360). The concern that fire and smoke emission characteristics of materials may change over time will be more fully examined in the second phase of this rulemaking.

A new category title ''Fabrics'' includes seat upholstery, mattress ticking and covers, and curtains, as formerly included under the category

[12] ''Passenger Rail Car Seat Fire Tests; ASTME E 1357/CAL TB 133.'' J. Zicherman and S. Markos. Draft Project Memorandum. December 1998. A copy of the report has been placed in the public docket for this rulemaking.

[13] ''Navigation and Inspection Circular No. 9–97. Guide to Structural Fire Protection.'' US Coast Guard. COMDTPUB P16700.4, October 31, 1997.

''Passenger seats, Sleeping and dining car components'' in the table in Appendix B of the NPRM. The term ''All'' under function of material eliminates confusion as to what must be tested; if composed of fabric, window shades, draperies and wall coverings are required to be tested. The test procedure for purposes of the burn test is an FAA test found at 14 CFR part 25, Appendix F, Part I (vertical test). FRA has referenced this test procedure directly in the table and, thereby, removed the intermediate reference to 14 CFR § 25.853(a), as stated in the NPRM. Formerly, smoke emission requirements were limited to ≤250 for ''coated'' and ≤100 for ''uncoated'' fabrics at four minutes. The latter is typically PVC vinyl-based upholstery fabric. It was determined that a uniform criteria of ≤200 at four minutes for the smoke emission rate would be appropriate for both classes of fabrics, based in part on the known performance of the range of fabrics available, and the definition of coated and uncoated used by the ASTM, rather than the terms used in the above-cited report, ''Rationale for Recommended Fire Safety Practices for Rail Transit Materials Selection,'' prepared by the Volpe Center in the early 1980s. Moreover, allowing a higher smoke emission performance criteria for coated fabrics—more than twice that allowed for uncoated fabrics—provides an inconsistent level of safety. In addition, the NFPA 130 Committee has accepted a recommendation for the identical change in its revised table requirements.

Notes 6 and 7, which pertain to washing and dry cleaning of materials, are almost identical to Notes 2 and 3 as proposed in the NPRM. These notes were renumbered to reflect consecutive numbering logic within the revised categories and function of materials. In addition, some upholstery materials must be dry cleaned. Accordingly, Note 7 applies to upholstery materials.

Note 8 was formerly the second sentence in Note 3 as proposed in the NPRM. However, since that sentence also included the words ''washed,'' as well as ''dry cleaned,'' this text was separated into a new Note 8 to ensure that the labeling requirement would be clearly understood to apply whatever cleaning method is used.

The new category ''Vehicle Components'' includes the majority of those materials formerly listed in the NPRM under the categories of ''Panels,'' ''Flooring'' (except structural), thermal and acoustical ''Insulation'' (see discussion below), ''Elastomers,'' ''Exterior Plastic Components,'' and ''Component Box Covers.'' Note 9 specifies, as a minimum, which combustible component materials must be tested, and is based on the components listed in the table in Appendix B of the NPRM.

Note 10 provides that testing of vehicle component miscellaneous, discontinuous small parts may not be necessary if such parts do not contribute materially to fire growth and the surface area of any individual small part is not greater than or equal to 16 square inches (100 cm^2) in end use configuration. A fire hazard analysis is required that considers both the quantity of the parts (*e.g.,* limited) and the location of the parts (*e.g.,* at discontinuous, or isolated locations, or both), as well as the vulnerability of the parts to ignition and contribution to flame spread. As an example, grommets used on seats or window shades present an insignificant fire threat and could logically and safely be exempted from testing. Such small parts have been selectively exempted through the use of similar language in rail car specification documents for many years. On the other hand, other materials, such as those used to produce wire ties (of which hundreds or thousands may be included in a single car to mount power and low voltage cable bundles) shall not be exempted from testing, as specified in Note 11.

Note 11 relates to Note 10. If the surface area of any individual small part is less than 16 square inches (100 cm^2) in end use configuration, such small part must be tested using the ASTM E 1354–97 test procedure, ''Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter'' (e.g., Cone Calorimeter), unless such small part has been shown not to contribute materially to fire growth following an appropriate fire hazard analysis as specified in Note 10. ASTM E 1354 measures heat release rate (HRR) at a prescribed heat flux using oxygen depletion techniques and produces information including data for time of ignition and peak HRR. The quotient of these two parameters has been evaluated as part of the current FRA-funded NIST research program, as well as in other research, and has been shown to reliably predict ignitability (*see* Hirschler, 1992, 1995 [14] [15]). Ignitability is also a parameter of importance for certain small parts used in rail passenger cars. In addition, such parts, because of their small size and end uses, may be important from an ignition perspective, but not from a flame spread perspective. The pass/fail criterion:

$$t_{ig} / \dot{q}''_{max} \leq 1.5$$

is defined by the ratio of a given sample's sustained time in seconds (s) to ignition (t_{ig}) to its peak (maximum) heat release rate ($\dot{q}''_{max}$), as measured in the Cone Calorimeter under the stipulated exposure conditions. This quantity has been demonstrated to be a direct measure of a material's sensitivity to ignition, which is important since the class of parts referred to here will not, due to their small size, contribute markedly to fire growth and heat release. However, these parts may, if capable of showing sustained ignition, cause secondary ignition of surrounding materials subsequent to their own ignition. The required heat flux exposure of 50 kW/m^2 is sufficiently high to ignite materials which have a reasonable degree of intrinsic ignition resistance. The pass/fail criterion is based on relatively current research, including that conducted by NIST for passenger railroad materials cited earlier. FRA notes that the ASTM E 1354 test method was not expressly referenced in the NPRM. However, as identified by the Volpe Center during its fire safety research, this test procedure is an appropriate way to address the flammability and smoke emission characteristics of small parts and its use in this final rule complements the exemption from testing otherwise provided for small parts as specified in Note 10. Note 12 relates to Note 11. If, in accordance with Note 11, small miscellaneous, discontinuous parts are tested using ASTM E 1354 and an appropriate fire hazard analysis accompanies the test results, such small parts do not have to be tested for smoke generation using the ASTM E 662 test procedure.

Flexible cellular foam products not used for seat and mattress applications are now included in the separate ''Vehicle Components'' category to address the unique fire-related properties represented when used for arm rests, seatback ''crash'' padding, and thermal and acoustical insulation. The different armrest test requirements in Note 8 in the NPRM have been deleted. The differentiation is no longer necessary since the new Function of Material ''Flexible Cellular Foams'' requires that armrest foam material be tested according to ASTM D 3675. If

[14] ''Tools Available to Predict Full Scale Fire Performance of Furniture,'' Fire and Polymers II. Hirschler, M.M. Ed. G. L. Nelson, ACS Symp. Series 599. Ch. 36, pp. 593–608.

[15] ''Effect of a Single Furnishing Product on Fire Hazard in Actual Occupancies Based on Heat Release Rate.'' Hirschler, M.M. Proceedings, NFPRF Symposium and FIre Risk & Hazard, San Francisco, June 25–27, 1997.

hard plastic, the armrest test requirement is ASTM E 162. Tests conducted by NIST in 1983 of Amtrak interior materials showed that foam armrests assist flame spread from seat cushions to wall liners.

Thermal and acoustical insulation materials were previously included as a separate table category in the NPRM, with values identical to cushions and mattresses for flame spread (less than or equal to 25) and smoke emission (less than or equal to 100 for 1.5 minutes). (Thermal and acoustical insulation did not expressly contain a smoke emission criterion for 4 minutes in the NPRM, though intended to be less than or equal to 200.) Flexible cellular foam is sometimes used as thermal and acoustical insulation; if so used, the requirements remain unchanged (25, 100, and 200, respectively). Otherwise, the performance criteria for insulation materials are now 35, 100, and 200, respectively, to be consistent with other vehicle components.

Note 13 relates to the use of carpet on walls and ceilings and is virtually identical to Note 10 as proposed in the NPRM. Note 14 concerns floor coverings and is virtually identical to Note 7 as proposed in the NPRM.

Two items having identical test performance criteria relating to use of plastics in light transmitting assemblies under the function of material column in the table in Appendix B in the NPRM have been combined into a new ''Light transmitting plastics'' function of material column in the final rule. This terminology is consistent with use of the term for identical plastics in the construction industry and building codes. The test performance criteria remain unchanged from the NPRM. In addition, this category also provides for uniform acceptance criteria for transparent plastics used in windscreens, which formerly were not clearly addressed. Note 15 pertains to window glazing and is virtually identical to that in Note 4 as proposed in the NPRM. Renumbering of the note reflects consecutive numbering logic.

The separate category of ''Elastomers'' in the table in the NPRM has been included under the function of material column in the ''Vehicle Components'' category in the table in the final rule. As indicated in Note 16, the flammability test method for elastomers has been revised to reference ASTM C 1166, which has superseded ASTM C 542 as proposed in the NPRM. As specified in Note 16, only elastomeric parts with surface areas equal to or more than 16 square inches (100 cm^2) in end use configuration are required to be tested using ASTM C 1166; elastomeric parts with smaller surface areas need not be tested using ASTM C 1166. Accordingly, diaphragms, window gaskets, door nosing, and roof mats would continue to be tested; in addition, due to their size, flexible flat seat ''springs'' or suspension membranes are also required to be tested using ASTM C 1166. Testing requirements for miscellaneous small parts comprised of elastomeric composition having a surface area less than 16 square inches are discussed in Notes 10, 11, and 12.

The test requirement differentiation in Notes 10, 11,12, and 16 according to part size is based on several factors. Many small miscellaneous parts used in car construction may be composed of elastomeric materials. These parts include cleats, blocks, abrasion and vibration damping pads. As such, these parts are frequently molded and are not readily available for testing in sizes required for either the ASTM E 162 or ASTM C 1166 test methods without undergoing special fabrication. Moreover, as noted in the discussion concerning Note 11, ASTM E 1354 is sensitive to ignition properties rather than flame spread. The later parameter would be a critical variable if such parts were used in applications with larger exposed surface areas.

The subject of ''Wire and Cable'' has been addressed by the addition of a new category in the table which requires smoke and flammability emission screening for wire and cable insulation. This is especially important due to the greater quantities of wire and cable used in electrically-powered intercity and commuter rail passenger cars. Fire-related tests and performance criteria for wire and cable insulation were not expressly included in the table proposed in Appendix B of the NPRM. The test methods of the IEEE, Insulated Cable Engineers Association (ICEA), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL) specified in the final rule have long and successful histories of use, and have also been specified in the existing NFPA 130 requirements. In Note 17, one set of test methods is comprised of NEMA WC 3/ ICEA S–19–1981, paragraph 6.19.6, and the second set is comprised of UL 44 and UL 83. The ICEA and NEMA jointly issued NEMA WC 3/ICEA S–19–1981, and it includes testing for both thermosetting wire insulation and for thermoplastic wire insulation. In Note 18, in addition to passing ANSI/IEEE Standard 383, section 2.5, the power cable must also demonstrate continued circuit integrity for 5 minutes to allow continued short term operation of power when exposed to ignition.

FRA notes that, in its comments on the NPRM, the IEEE (like the NFPA) referred to the National Technology Transfer and Advancement Act of 1995, above, and the provision which requires, in general, that Federal agencies ''use technical standards that are developed or adopted by voluntary consensus standards bodies.'' The IEEE cited its own development of voluntary consensus standards and their potential for integration in this rulemaking. In the second phase of the rulemaking, FRA will consider with the Working Group the appropriate use of other IEEE standards in this and other subject areas, in addition to the IEEE standard contained in this rule for fire safety.

The new category ''Structural Components'' addresses the structural integrity of floor assemblies and other structural elements. In Appendix B of the NPRM, only the performance of structural flooring was expressly addressed in the table itself and in the text of former Note 6. The first sentence of text relating to penetrations as proposed in Note 6 in the NPRM has been separated and inserted as Note 19 in the final rule. Note 19 requires that penetrations be tested as part of floor assemblies and other structural elements. The text in the second sentence of Note 6 as proposed in the NPRM specifically pertained to structural flooring assemblies, and it has been separated and inserted into Note 20 in the final rule.

Note 21 addresses the structural integrity of less well defined and design dependent rail car structural elements, other than floors. These structural elements may carry significant weight loads or have important fire barrier functions in protecting train occupants, or both. Examples include extensive HVAC or power-conditioning equipment installed on roofs or electrical equipment lockers, which may become involved in fires. Such fires may result from mechanical failures, electrical insulation breakdown, or from other hazards. Accordingly, Note 21 requires that portions of the vehicle body (other than floors but including the roof) which separate major ignition sources, or sources of fuel load from the vehicle interior, demonstrate fire endurance by a fire hazard analysis acceptable to the railroad.

The following summary lists the changes to the content of the notes and their numbering from the NPRM, reflecting both the table reorganization in the final rule as well as additional requirements: Note 1 is virtually identical to that in the NPRM. Note 2 is

virtually identical to Note 5 in the NPRM. Note 3 permits the testing of seat and mattress assemblies according to ASTM E 1537 using Cal TB 133 performance criteria. Note 4 is identical to Note 9 in the NPRM. Note 5 requires dynamic testing of seat cushions. Notes 6 and 7 are virtually identical to Notes 2 and 3 in the NPRM. The text of Note 8 is virtually identical to the second sentence of Note 3 in the NPRM. Note 9 lists vehicle component materials which must be tested, at a minimum. Note 10 allows a testing exception for materials used to fabricate small, discontinuous parts that will not contribute materially to fire growth in end use configuration, provided an appropriate fire hazard analysis is conducted. Note 11 requires that if the surface area of any individual small part is less than 16 square inches (100 cm^2) in end use configuration, such small part must be tested using the ASTM E 1354 test procedure, unless such small part has been shown not to contribute materially to fire growth following an appropriate fire hazard analysis as specified in Note 10. Note 12 relates to Note 11. If, in accordance with Note 11, small parts are tested using ASTM E 1354 and an appropriate fire hazard analysis accompanies the test results, such small parts do not have to be tested for smoke generation using the ASTM E 662 test procedure. Note 13 is virtually identical to Note 10 in the NPRM. Note 14 is virtually identical to Note 7 in the NPRM. Note 15 is virtually identical to Note 4 in the NPRM. Note 16 provides test requirements for elastomeric materials greater than 16 square inches (100 cm^2) in end use configuration and requires that, at a minimum, window gaskets, door nosings, diaphragms, and roof mats be tested. Notes 17 and 18 apply to wire and cable insulation. Note 19 is based on the last sentence of text formerly in Note 6 in the NPRM. Note 20 contains the first part of text of Note 6 in the NPRM. Note 21 addresses new test requirements for other structural components, such as car roofs and electrical cabinets, in addition to the floor assembly.

The list of standards contained in Appendix B, paragraph (c), in the NPRM has been revised and updated.

Appendix C—Suspension System Safety Performance Standards

The purpose of Appendix C is to prevent the occurrence of a variety of derailments due to forces on wheels. FRA has revised and clarified the requirements of this appendix based on comments received in response to the NPRM.

First, Bombardier commented that as proposed by FRA some differences existed between Appendix C and the requirements of the then-proposed Track Safety Standards, § 213.333. Consequently, Bombardier recommended that FRA change Appendix C to resolve the discrepancies; or eliminate Appendix C and reference the track safety standards' table of vehicle/track interaction performance limits in § 213.333 and incorporate Bombardier's proposed changes submitted as part of its September 15, 1997 hearing testimony on the track safety standards.

At the Working Group meeting in January 1998, a Volpe Center representative explained that the discrepancy between proposed Appendix C and the proposed track safety standards may be justifiable because Appendix C would apply only to new passenger equipment; whereas the then-proposed standards in the track safety rule would apply to both new and existing equipment. Appendix C's standards could therefore be necessarily stricter. In this regard, FRA has retained Appendix C and not simply referenced the track safety standards' table of vehicle/track interaction performance limits in 49 CFR § 213.333. Points 4 and 6 in Appendix C are not found in the track safety standards' table of vehicle/track interaction safety limits, and thus need to be retained in this passenger equipment rule to ensure the safety of new passenger equipment. However, FRA has otherwise reconciled Appendix C with the track safety standards' table in § 213.333.

Talgo, in its comments on proposed Appendix C, suggested that FRA reword the second paragraph in the Appendix to clarify that the performance standards are meant to apply to the average values for the parameters recorded during the time the train travels six feet. FRA has not adopted Talgo's suggestion, however. FRA intended that the performance standards apply to the maximum values for the parameters recorded to ensure that the passenger equipment operates within outer safety limits. Use of average values would mask real safety concerns.

Talgo also recommended that FRA define the method for signal filtering. FRA has adopted Talgo's recommendation and specified that, for purposes of this appendix, wheel/rail force measurements shall be processed through a low pass filter having a cut-off frequency of 25 Hz.

Finally, Talgo recommended that points 4 and 5 in the appendix be revised to acknowledge that they should not be applied to single-axle trucks. FRA has not adopted Talgo's recommendation with respect to points 4 and 5, to the extent that an exemption for rail cars with single-axle trucks was sought. However, FRA provides the following clarification of points 4 and 5. Point 4 provides that the sum of the vertical wheel loads on one side of any truck shall not be less than or equal to 20 percent of the static vertical axle load, and that this shall include the effect of a crosswind allowance as specified by the railroad for the intended service of the equipment. Whether the rolling assembly is a single-axle or a double-axle truck, or whether solid or stub axles are used to configure the truck, the risk of wheel unloading is still present. If the vehicle is subjected to forces that reduce the static vertical load per truck side to 20% or less of the static axle load, an unsafe condition may exist. Point 4, therefore, requires that the sum of vertical wheel loads on any side of any truck (or any other suspension configuration per car end or between two car ends) be always greater than 20% of the static vertical axle load. For stub (non-solid) axles, an equivalent static vertical axle load may be computed by adding the static vertical wheel loads on opposite sides. If the rolling assembly has only one axle per suspension unit, as in the case of Talgo equipment, then any single wheel load is required to be always greater than 20% of its static value. As a result, point 4 of this appendix will constitute a more stringent requirement than provided in point 3. Point 5 of the appendix requires that the maximum truck side L/V ratio not exceed 0.6. If the rolling assembly has only one axle per suspension unit, as in the case of Talgo equipment, then the corresponding L/V ratio computed for each consecutive pair of axles shall be similarly limited to 0.6.

Appendix D to Part 238—Requirements for External Fuel Tanks on Tier I Locomotives

This appendix contains the performance requirements for external fuel tanks on Tier I locomotives, as adapted from AAR Recommended Practice (RP) 506, ''Performance Requirements for Diesel Electric Locomotive Fuel Tanks,'' effective July 1, 1995. In incorporating this industry practice into Federal regulation, FRA has rephrased the text of RP–506 in part. Yet, no substantive change is intended, except as noted below. RP–506, a copy of which is available in the public docket of this rulemaking, is comprised of sections entitled ''Scope,'' ''Background,'' ''Limitations,'' and ''Structural Strength Requirements.'' Appendix D represents the section

entitled ''Structural Strength Requirements,'' or Section 4 in RP–506.

FRA has not included Section 4.4 of RP–506 in Appendix D. Section 4.4 (''Fueling'') states, ''Internal structures of [the] tank must not impede the flow of fuel through the tank while fueling at a rate of 300 gpm [gallons per minute].'' The rate at which a fuel tank may be fueled is only a safety concern in the broad sense that the fuel not spill from the tank while fueling. Of course, FRA recognizes that railroad fuel dispensers utilize automatic shut-off devices that will stop the flow of fuel before the fuel spills out of the tank if the fuel is dispensed too readily for the tank to process. The ability of the tank to accept fuel at a certain rate per minute therefore appears to be more of an operational concern than a safety concern for a railroad in that the process of fueling locomotives not be unnecessarily delayed.. As a result, FRA will not make Section 4.4. of RP–506 a safety requirement of this rule, even though a railroad is free to make it its own requirement in acquiring locomotives.

X. Regulatory Impact

A. Executive Order 12866 and DOT Regulatory Policies and Procedures

This rule has been evaluated in accordance with existing policies and procedures and is considered to be significant under both Executive Order 12866 and DOT policies and procedures (44 FR 11034; Feb. 26, 1979). FRA has prepared and placed in the docket a full regulatory evaluation of the rule (only a summary is provided below). This evaluation estimates the costs and consequences of the rule as well as its anticipated economic and safety benefits. The evaluation may be inspected and photocopied during normal business hours by visiting the FRA Docket Clerk at the Office of Chief Counsel, FRA, Seventh Floor, 1120 Vermont Avenue, in Washington, D.C. Photocopies may also be obtained by submitting a written request by mail to the FRA Docket Clerk at the Office of Chief Counsel, FRA, 1120 Vermont Ave, Mail Stop 10, Washington, D.C. 20590.

Certain requirements in the rule reflect current industry practices or restate existing regulations, or both. As a result, in calculating the costs of this rule, FRA has neither included the cost of those actions that would have been performed voluntarily in the absence of this rule, nor the costs of those actions that would have been required by the existing regulations that have been restated in this rule. Further, in calculating the benefits arising from this rule, FRA has not included as a benefit any good resulting from such actions.

FRA expects that overall this rule will save the passenger rail industry approximately $20 million Net Present Value (NPV) over the next twenty years. Rail passengers are expected to benefit from reduced delays totaling approximately $11 million (twenty-year NPV). FRA expects the NPV of the total twenty-year costs incurred associated with the rule to be $68.5 million. The NPV of the total twenty-year savings expected to accrue to the industry from the rule is approximately $87 million. For some passenger rail operators, the total costs incurred will exceed the total cost savings. For others, the cost savings will outweigh the costs. Expected safety benefits coupled with reduced passenger train delays outweigh the estimated costs of compliance with this rule.

The following tables present the estimated twenty-year costs and savings (NPV) associated with the specific requirements in this final rule. To the best of FRA's ability, FRA has apportioned the total costs and savings in the following tables between Amtrak, commuter railroads, and the State of Washington to more precisely show the effects of this final rule on these different entities. In commenting on the NPRM, APTA had recommended that FRA segregate the costs and benefits to commuter railroads from those involving Amtrak—and not represent both Amtrak and commuter railroads together. FRA has separately identified the State of Washington in the tables below because of the unique concerns involving its operation of Talgo passenger equipment, discussed above in the preamble.

Ideally, FRA would separately show the costs and savings for commuter railroads from those involving Amtrak for each requirement in the rule. However, FRA cannot separate some of the twenty-year costs and savings of this rule with any degree of accuracy between Amtrak and commuter railroads, especially for passenger equipment that is not yet in service. For instance, FRA does not know how often Amtrak will order new equipment or what specific type of equipment that may be. To a certain extent, railroads will be able to control their level of expenditures in response to this rule by choosing to overhaul or rebuild equipment they own or by purchasing existing equipment from other railroads instead of ordering new equipment. Of course, FRA can more precisely apportion the costs and savings between Amtrak and commuter railroads for the inspection, testing, and maintenance requirements in this rule; those requirements will most significantly impact the existing fleet of passenger equipment, which is readily identifiable.

NPV 20-YEAR COSTS INCURRED

Requirement category	Amtrak	Commuter rail	Washington State	Total
Fire Safety—Materials	$0	$0	$0	$0
Certification	(*)			84,752
New Equipment				253,625
Existing Equipment				675,004
Inspect/Test/Maint.				142,056
Train Hardware & Software	0	0	0	0
Inspect/Test/Maint. Program:				
Existing Equipment				277,816
New Equipment				167,958
Training Program:				
Course Development				1,720,629
Exterior Mech. Inspect.				5,081,250
Interior Mech. Inspect.				3,408,940
Pre-Revenue Service Testing:				
Equip w/Prev. Op. Exp.				16,950
Equip w/Out Prev. Op. Exp.				233,373
Rim-Stamped Straight-Plate Wheels	0	0	0	0

NPV 20-YEAR COSTS INCURRED—Continued

Requirement category	Amtrak	Commuter rail	Washington State	Total
Emergency Lighting	0	0	0	0
Talgo—Risk Assessment	0	0	280,634	280,634
Anticlimber & Link to Car Body	0	129,296	0	129,296
Forward End Structures	0	8,190,145	0	8,190,145
Corner Posts	0	1,532,517	0	1,532,517
Rollover Strength	.....	.....	.....	29,305
Side Structure	0	0	0	0
Truck to Car Body Attachment	0	0	0	0
Glazing	.....	.....	.....	1,303,894
Fuel Tanks	0	0	0	0
Electrical System	0	0	0	0
Suspension System	0	0	0	0
Brake System—Ease of Inspection	.....	.....	.....	32,179
Interior fittings and Surfaces	.....	.....	.....	2,608,856
Emergency Window Exits	0	0	0	0
Doors—Manual Door Release	0	3,968,598	0	3,968,598
Automated Monitoring	.....	.....	.....	30,503
Mvmt Defective Equip—Non Brakes	.....	.....	.....	25,934
Mvmt Defective Equip—Brakes	.....	.....	.....	735,249
Reporting and Tracking System	0	5,371,054	0	5,371,054
Daily Exterior Mech. Inspections	3,009,223	16,712,854	0	19,722,077
Qualified Maintenance Person	0	1,447,370	.....	1,447,370
Daily Interior Mech. Inspections	.....	.....	.....	10,861,361
Periodic Mechanical Inspection	.....	.....	.....	201,639
Single Car Test	0	0	0	0
Total Costs	.....	.....	.....	68,532,966

NPV 20-YEAR SAVINGS

Requirement category	Amtrak	Commuter rail	Washington State	Total
COT&S Interval Extensions:				
Coaches	$0	$9,227,510	$0	$9,227,510
MU locomotives	0	33,368,421	0	33,368,421
Cab cars	0	7,191,358	0	7,191,358
1,500-mile brake inspection	31,852,373	0	0	31,852,373
Class IA brake tests	0	4,360,701	0	4,360,701
Mvmt Defect Brakes—RR	.....	.....	.....	632,592
Mvmt Defect Brakes—Passengers	.....	.....	.....	11,368,651
Total Savings	.....	.....	.....	98,019,605
Total Twenty-Year Net Impact: $29,486,639 (Savings).				

(*In the above tables, a ''—'' indicates that total costs or savings, as appropriate, could not be apportioned between Amtrak, commuter railroads, and the State of Washington.)

FRA notes that as a result of the final rule's requirement to conduct fire safety analyses of existing passenger equipment, the analyses may indicate that modifications to existing equipment are necessary to reduce the level of risk of fire or smoke to an acceptable level. Although costs associated with performing the analyses are included in the calculations above, costs associated with performing any equipment modifications are not. If costs associated with equipment modifications are incurred, they will be incurred over the first four years of the rule and could total between $8.75 million and $14 million for existing equipment. If costs associated with installation of additional fire and smoke detection and suppression systems are incurred for new equipment, total twenty-year costs (NPV) could increase by up to $3.9 million. These costs are not included in the calculations presented above because FRA cannot predict with any degree of precision the results of the fire safety analyses. Should equipment modifications, and fire and smoke detection and suppression systems be required, the total net impact of the rule could be reduced from a savings of $29.5 million to a savings of $11.6 million (NPV). Rail operators would experience a minimal savings.

Intercity passenger and commuter railroads generally offer the travelling public one of the safest forms of transportation available. However, the history of passenger train accidents shows that the potential for injury and loss of life is significant. Between January 1, 1990, and December 31, 1997, there were a total of 93 passenger fatalities on intercity passenger and commuter railroads, representing a total economic loss of $251 million. Sixty-eight passenger fatalities occurred when the trains carrying the passengers were involved in derailments or collisions. FRA believes that it is reasonable to expect that the measures called for in this rule will prevent or mitigate the severity of casualties greater in value than the costs to rail carriers of implementing the requirements of this rule.

The unique circumstances surrounding each future passenger train accident will determine the ultimate effectiveness of this rule and FRA's other strategies to improve passenger rail safety. Similar accidents have unique characteristics which ultimately determine an accident's severity in terms of casualties. As a result, we cannot at this time forecast future accident scenarios with a level of precision that would allow us to predict the actual need for the particular measures in this rule. However, this rule protects railroad employees and passengers against known hazards that can be mitigated in a cost-effective manner. For each cost associated with a requirement in this rule, FRA has examined the potential safety benefits accruing from the requirement. Certain elements of the rule, such as the structural requirements, will directly improve safety by decreasing threats to life and property. Other elements of the rule will provide savings to the rail industry while maintaining or improving the industry's excellent safety record overall.

In its comments on the proposed rule, the NCDOT stated that the summary economic analysis contained in the NPRM did not include an analysis of the impact on individual States. The NCDOT believed the cost summary to be understated and not include an operator by operator analysis. The above summary does specify this rule's impact on Washington State. Further, as noted, a copy of the full regulatory evaluation of this rule is available through the FRA Docket Clerk. That evaluation does include, where appropriate, discussions of the rule's impact on particular railroads or groups of railroads. The evaluation also takes into consideration that individual States will contract with Amtrak for the provision of rail service on their behalf. In this regard, for example, a State may utilize Amtrak's inspection forces trained under the rule, and thus not have to train inspection forces on its own.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires an assessment of the impacts of proposed rules on small entities. FRA has conducted a regulatory flexibility assessment of this final rule's impact on small entities, and the assessment has been placed in the public docket for this rulemaking. FRA certifies that the final rule will not have a significant impact on a substantial number of small entities. This final rule affects intercity passenger and commuter railroads, rapid transit operations that operate on the general system of transportation, and certain private car owners. FRA notes that the standards contained in this rule were developed in consultation with a Working Group that included Amtrak, individual commuter railroads, APTA, and the AAPRCO. APTA represents the interests of commuter railroads and rapid transit systems in regulatory matters. The AAPRCO represents the interests of private car owners in regulatory matters.

Except for private car owners, the entities impacted by the final rule are governmental jurisdictions, known as transit authorities, none of which are small for purposes of the prevailing law. The statutory definition of ''small governmental jurisdictions'' is a governmental entity that serves a population center of 50,000 or less. *See* 5 U.S.C. 601(5). The transit authorities subject to the requirements of this rule do not fall within the class established by statute. Nevertheless, FRA considered the impacts of this final rule on the smaller entities subject to the rule. Commuter railroads and rapid transit systems are part of larger transit organizations that receive Federal funds. The level of costs incurred by each organization should generally vary in proportion to either the size of the organization or the extent to which the organization purchases newly manufactured passenger equipment. For instance, railroads with fewer employees and passenger equipment will have lower costs associated with employee training and the inspection, testing, and maintenance of passenger equipment. FRA notes that this rule offers railroads the opportunity to experience savings in the areas of inspection, testing, and maintenance of passenger equipment. The extent of these savings will generally vary proportionally with the size of the fleet of each railroad.

FRA is making only certain requirements in this rule applicable to private cars that are operated in passenger trains subject to this rule. FRA considered the potential burdens associated with applying the various requirements in this rule to private car owners and operators. FRA is limiting the application of this rule only to those requirements necessary to ensure the safe operation of the passenger train in which the private cars operate, as well as the safety of railroad personnel handling or inspecting the cars. The economic impacts to private cars owners are expected to be minimal, however. Among the provisions applicable to private cars are daily mechanical inspection requirements; brake inspection, testing, and maintenance requirements; and a prohibition concerning rim-stamped straight-plate wheels on tread-braked passenger equipment.

FRA recognizes that private cars affected by this final rule are principally hauled by Amtrak, which imposes its own safety requirements on the operation of private cars. As a result, the daily exterior mechanical inspection requirements in this final rule, though new Federal requirements, are only minimally more stringent than the mechanical inspections currently performed by Amtrak on its own. The final rule does offer the flexibility to move equipment with power brake defects, as well as the flexibility to perform daily brake tests and mechanical inspections at locations best suited for performing such tests and inspections. To the extent that all passenger equipment is subject to daily exterior mechanical inspections, private cars will not be affected disproportionately.

Generally, the final rule requires that rim-stamped straight-plate wheels not be used as replacement wheels on tread-braked private cars. Amtrak has established a private car policy which does not allow the use of rim-stamped straight-plate wheels as replacement wheels on private cars. Further, Amtrak will decline to move any tread-braked private car with a rim-stamped straight-plate wheel after June 30, 2000. Because Amtrak holds private cars to standards as high or higher than those contained in this rule, there will be no additional economic impact imposed on private cars operated in Amtrak trains from this rule's rim-stamped straight-plate wheel provision. Private cars are also subject to provisions in this final rule concerning protection against personal injury, suspension system safety, safety appliances, and brake system safety. These requirements represent either current industry practice or current Federal safety requirements (which are being restated in this final rule).

Smaller passenger rail operations such as tourist, scenic, excursion, and historic railroads are exempt from this final rule. A joint FRA/industry Working Group will be developing recommendations regarding the applicability of FRA regulations, including this one, to tourist, scenic, historic, and excursion railroads. Based on that Working Group's recommendations, portions of the final rule may apply to some or all of these railroads.

C. Paperwork Reduction Act

This rule contains information collection requirements. FRA has

submitted these information collection requirements to the Office of Management and Budget (OMB) for review and approval in accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). The sections that contain the new or revised information collection requirements, or both, and the estimated time to fulfill each requirement are as follows:

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
216.14—Special notice for repairs—passenger equipment.	19 railroads	12 forms	5 minutes	1 hour	$39
238.1—Earlier application—rule requirements—sections 238.15, 238.17, 238.19, 238.107, 238.109.	19 railroads	15 notifications	45 minutes	11 hours	429
238.7—Waivers	19 railroads	12 waivers	2 hrs/25 hrs	70 hours	2,730
238.11—Penalties	19 railroads	1 falsified rept	15 minutes	.25 hr.	9
238.15—Movement of passenger equipment with power brake defects, and	19 railroads	1,000 cards/tags	3 minutes	50 hours	2,500
—Movement of passenger equipment with power brake defects develop en route.	19 railroads	288 cards/tags	3 minutes	14 hours	700
—Conditional requirement	19 railroads	144 notifications	3 minutes	7 hours	350
238.17—Movement of passenger equipment with other than power brake defects.	19 railroads	200 tags/cards	3 minutes	10 hours	340
—Movement of passenger equipment with safety appliance defects.	19 railroads	76 tags	3 minutes	4 hours	136
	19 railroads	38 notifications	30 seconds	19 min.	11
238.19—Reporting and tracking defective passenger equipment.	19 railroads	N/A	Usual and customary procedure.	N/A	N/A
—List of power brake repair points.	1 railroad	1 list	2 hours	2 hours	78
—Amendments to list	1 railroad	1 update	1 hour	1 hour	39
238.21/238.103/238.223(a)/238.309(2)/238.311(a)/238.405(a)/238.427(a):					
—Petitions for special approval of alternative standard.	19 railroads	1 petition	16 hours	16 hours	624
—Petitions for special approval of alternative compliance.	19 railroads	1 petition	120 hours	120 hours	4,680
—Petitions for special approval of pre-revenue service acceptance testing plan.	19 railroads	1 petition	24 hours	24 hours	936
—Comments on the petitions.	Unknown	2 comments	1 hour	2 hours	140
238.103—Fire Safety:					
—Plan	6 equipment manufacturers.	2.4 eq. design (5 yr. average).	200 hours	480 hours	33,360
—Subsequent equipment orders.	6 equipment manufacturers.	2.4 eq. design (5 yr. average).	60 years	144 hours	14,400
—Preliminary fire safety analysis.	19 railroads	19 documents	119 hours	2,264 hours	501,241
—Final fire safety analysis	18 railroads	6 documents (3 yr. average).	135 hours	811 hours	81,067
—Fire safety analysis on equipment transfer.	19 railroads	1 document	8 hours	8 hours	800
—Written procedures—fire safety system and fire safety equipment.	19 railroads	19 written procedures	80 hours	1,520 hours	106,400
238.105—Train hardware and software safety.	197 railroads	N/A	Usual and customary procedure.	N/A	N/A
238.107—Inspection, testing, and maintenance plan:					
—Plan	19 railroads	N/A	Usual and Customary procedure.	N/A	N/A
—Annual plan review by railroads.	19 railroads	19 reviews	60 hours	1,140 hours	44,460
238.109 Training, qualification, and designation program:					

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
—Training employees to perform brake-related inspections, tests, or maintenance.	17 railroads	N/A	Usual and customary procedure.	N/A	N/A
—Training employees to perform daily mechanical inspections.	19 railroads	6,020 trained employees/241 instructors.	2 hours	12,522 hours	421,410
—Development of training program.	19 railroads	19 programs	520 hours	9,880 hours	360,620
—Recordkeeping	19 railroads	6,020 records	3 minutes	301 hours	11,739
238.111—Pre-revenue service acceptance testing plan—equip. prev. in revenue service.	6 equipment manufacturers.	2.4 plans (5 yr. average).	16 hours	38 hours	2,641
—Pass equip. that has not been in revenue service in U.S.	6 equipment manufacturers.	2.4 plans (5 yr. average).	200 hours	480 hours	42,144
—Subsequent equipment orders.	6 equipment manufacturers.	2.4 plans (5 yr. average).	60 hours	144 hours	11,472
—Major upgrades/intro. new tech.—Tier II.	1 equipment manuf	None likely	N/A	N/A	N/A
238.201—Alternative compliance.	19 railroads	Incl. in 238.21	Inc. 238.21	Incl. 238.21	Incl. 238.21
238.203—Static end strength:					
—Grandfathering non-compliant equip.	19 railroads	1 petition	300 hours	300 hours	21,000
—Comment	Unkown	6 comments	20 hours	120 hours	8,400
238.211—Collision posts	19 railroads	Incl. in 238.21	Incl. 238.21	Incl. 238.21	Inc. 238.21
238.223—Locomotive fuel tanks—alt. std.	19 railroads	Incl. in 238.21	Incl. 238.21	Incl. 238.21	Inc 238.21
238.231—Brake system—identified & marked.	2 brake manufacturers.	N/A	N/A	Usual and cust.	N/A
238.237—Automated monitoring:					
—Alerter/Deadman control—documentation.	19 railroads	19 documents	2 hours	38 hours	1,482
—Defective alerter/Deadman control.	19 railroads	100 tags	3 minutes	5 hours	250
238.301—Scope—requirements—earlier application.	19 railroads	Incl. in 238.1	Incl. in 238.1	Incl. in 238.1	Incl. 238.1
238.303—Exterior calendar day mechanical inspection of passenger equipment—door and cover plates guarding high voltage equip.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—MU locomotives w/ inoperative dyn. brakes.	19 railroads	50 tags/cards	3 minutes	3 hours	150
—Conventional locos. w/ inoper. dyn. brakes.	19 railroads	50 tags/cards	3 minutes	3 hours	150
—Written notice—inoperative dyn. brakes.	19 railroads	25 written not	3 minutes	1 hour	34
—Records—ext. calendar day mech. insp.	19 railroads	2,022,436 recd	1 minute	33,707 hours	1,146,038
238.305—Interior calendar day mechanical inspection of passenger cars:					
—Stenciling or marking emergency brake valve.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Stenciling or marking high voltage equipment.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Tagging of defective doors.	10 railroads	600 tags	1 minute	10 hours	340
—Safety related signage	N/A	N/A	Usual and customery customery procedure.	N/A	N/A
—Records	19 railroads	1,866,904 recds	1 minute	31,115 hours	1,057,910
238.307—Periodic mechanical inspection of passenger cars:					
—Written notification—alt. periodic insp. int.	5 railroads	5 notifications	5 hours	25 hours	975
—Switches—markings	N/A	N/A	Usual and customary procedure.	N/A	N/A

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
—Records	6 railroads	15 records	3 minutes	.75 hours	29
—Detailed documentation—alt. insp. interval.	5 railroads	5 documents	100 hours	500 hours	19,500
238.309—Alternative maintenance proc.	19 railroads	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Inc. 238.21
—Records of periodic maintenance.	N/A	N/A	Usual and customary procedure.	N/A	N/A
238.311—Single car test—alt. procedure.	19 railroads	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Inc.—238.21
—Tagging to indicate need—single car test.	19 railroads	25 tags	3 minutes	1 hour	34
238.313—Class I brake test	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Documentation—test already performed.					
—Qualif. maint. Person.—statement in cab.					
238.315—Class IA brake test:					
—Brake pipe pressure—communications.	19 railroads	365,000 comm	3 seconds	304 hours	10,336
—Communicating signal system—tests.	19 tests	365,000 tests	15 seconds	1,521 hours	51,714
238.317—Class II Brake Test:					
—Brake pipe pressure—communications.	19 railroads	365,000 comm	3 seconds	304 hours	10,336
—Communicating signal system—tests.	19 railroads	365,000 tests	15 seconds	1,521 hours	51,714
238.403—Crash energy management requirements.	1 railroad	1 design	120 hours	120 hours	12,000
238.405—Longitudinal static compressive.	1 railroad	Incl. in 238.21	Incl.—238.21	Incl.—238.21	Inc.—238.21
238.421—Gazing:					
—Marking of glazing material.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Stenciling requirement	N/A	N/A	Usual and customary procedure.	N/A	N/A
238.423—Fuel tanks—equiv. level of safety.	N/A	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Inc.—238.21
238.427—Suspension system—alt. stds.	N/A	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Incl.—238.445
—Hunting oscillations—alarms to train oper.	1 railroad	Incl. in 238.445	Inc.—238.445	Inc.—238.445	In.—238.445
238.431—Brake system	1 railroad	1 analysis	40 hours	40 hours	1,560
—Brake system failures	1 railroad	Incl. 238.445	Incl. 238.445	Incl. 238.445	In 238.445
—Wheel slide alarms	1 railroad	Incl. 238.445	Incl. 238.445	Incl. 238.445	In 238.445
238.437—Emergency communication.	3 car manufacturers	3 instructions	1 hour	3 hours	102
238.441—Emergency roof entrance location.	3 car manufacturers	16 cars marked	15 minutes	4 hours	136
—Markings					
238.445—Automated monitoring.	1 railroad	200 alerts	1 second	3 minutes	2
—Self test feature—notifications to train operator.	1 railroad	6,300 notifications	1 second	2 hours	68
238.447—Train operator's controls and power car cab layout.	N/A	N/A	Usual and customary procedure.	N/A	N/A
238.503—Inspection, testing, and maintenance requirements:					
238.505—Program approval procedures:					
—Submission of program	1 railroad	1 program	80 hours	80 hours	3,120
—Amendments to program.	1 railroad	1 amendment	8 hours	8 hours	312
—Comments	4 unions/individuals	4 comments	1 hour	4 hours	276
—Approval	N/A	N/A	No disapprovals expected at this time.	N/A	N/A
238.603—Safety planing requirements—Process to introduce new technology.	1 railroad	1 safety plan	100 hours	100 hours	3,900
Appendix B to Part 238—labeling requirement.	5–6 seat manufacturers.	N/A	Usual customary procedure.	N/A	N/A

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
—Seat/Mattress assemblies—fire haz. analysis.	5–6 manuf	Incl. 238.103	Incl. 238.103	Incl. 238.103	In 238.103
—Disc. small parts—fire hazard analysis.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103
—Surface any small part—fire haz. analysis.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103
—Small elastomers/misc. parts—fire haz. anal.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103
—Portions vehicle body—fire hazard analysis.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103

All estimates include the time for reviewing instructions; searching existing data sources; gathering or maintaining the needed data; and reviewing the information. For information or a copy of the paperwork package submitted to OMB contact Mr. Robert Brogan, Office of Safety, Planning and Evaluation Division, RRS–21, Federal Railroad Administration, 1120 Vermont Ave., N.W., Mail Stop 17, Washington, D.C. 20590 (telephone: (202) 493–6292) or Ms. Dian Deal, Office of Information Technology and Productivity Improvement, RAD–20, Federal Railroad Administration, 1120 Vermont Ave., N.W., Mail Stop 35, Washington, D.C. 20590 (telephone: (202) 493–6133).

FRA cannot impose a penalty on persons for violating information collection requirements which do not display a current OMB control number, if required. The information collection requirements contained in this rule have been approved under OMB control number 2130–0544.

D. Environmental Impact

FRA has evaluated these regulations in accordance with its procedures for ensuring full consideration of the environmental impact of FRA actions, as required by the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), other environmental statutes, Executive Orders, and DOT Order 5610.1c. This final rule meets the criteria that establish this as a non-major action for environmental purposes.

E. Federalism Implications

This rule has been analyzed in accordance with the principles and criteria contained in Executive Order 12612, and it has been determined that the rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment. The fundamental policy decision providing that Federal regulations should govern aspects of service provided by municipal and public benefit corporations (or agencies) of State governments is embodied in the statute quoted above (49 U.S.C. 20133). Further, FRA has consulted with commuter railroad authorities in developing this rule.

F. Compliance With the Unfunded Mandates Reform Act of 1995

Pursuant to the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) each Federal agency ''shall, unless otherwise prohibited by law, assess the effects of Federal Regulatory actions on State, local, and tribal governments, and the private sector (other than to the extent that such regulations incorporate requirements specifically set forth in law).'' Sec. 201. Section 202 of the Act further requires that ''before promulgating any general notice of proposed rulemaking that is likely to result in promulgation of any rule that includes any Federal mandate that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100,000,000 or more (adjusted annually for inflation) in any 1 year, and before promulgating any final rule for which a general notice of proposed rulemaking was published, the agency shall prepare a written statement . . .'' detailing the effect on State, local and tribal governments and the private sector. The final rules issued today will not result in the expenditure, in the aggregate, of $100,000,000 or more in any one year, and thus preparation of a statement was not required.

G. Effects on the Year 2000 Computer Problem

This rule does not mandate business process changes nor require modifications to computer systems that will detract from resources railroads will apply toward addressing any possible Year 2000 computer problems. Although business process changes and modifications to computer systems may occur as this rule is implemented, railroads would only voluntarily make such changes and modifications before the year 2000.

Implementation of certain inspection, testing, and maintenance requirements, as well as recordkeeping and tracking of defective equipment requirements, would require use of the same resources railroads will apply toward resolving Year 2000 computer problems. However, FRA will not require that such implementation occur before July, 2000. FRA will apply requirements for inspection, testing, and maintenance of equipment, and recordkeeping and tracking, at an earlier date only to those railroads that indicate a desire for this to occur. Because certain of the requirements for inspection, testing, and maintenance offer railroads an opportunity to achieve efficiencies and savings, some railroads may voluntarily choose to have these requirements applied to them earlier. FRA notes that its implementation schedule for inspection, testing, and maintenance requirements, as well as recordkeeping and tracking requirements, was also developed taking into consideration the time generally needed for railroads to develop maintenance programs and implement training requirements as required by this rule.

XI. List of Subjects

49 CFR Part 216

Penalties, Railroad safety, Reporting and recordkeeping requirements, Special notice for repairs.

49 CFR Part 223

Glass and glass products, Glazing, Penalties, Railroad safety, Reporting and recordkeeping requirements.

49 CFR Part 229

Locomotives, Penalties, Railroad safety, Reporting and recordkeeping requirements.

49 CFR Part 231

Penalties, Railroad safety, Safety appliances.

49 CFR Part 232

Penalties, Power brakes, Railroad safety, Reporting and recordkeeping requirements.

49 CFR Part 238

Fire prevention, Incorporation by reference, Passenger equipment, Penalties, Railroad safety, Reporting and recordkeeping requirements.

The Rule

In consideration of the foregoing, chapter II, subtitle B of title 49, Code of Federal Regulations is amended as follows:

PART 216—[AMENDED]

1. The authority citation for part 216 is revised to read as follows:

Authority: 49 U.S.C. 20102–04, 20111, 20133, 20137–38, 20141, 20143, 20301–02, 20701–02, 21301–02, 21304; 49 CFR 1.49(c), (m).

2. Section 216.1(a) is revised to read as follows:

§ 216.1 Application.

(a) This part applies, according to its terms, to each railroad that uses or operates—

(1) A railroad freight car subject to part 215 of this chapter;

(2) A locomotive subject to 49 U.S.C. chapter 207 (49 U.S.C. 20701–03); or

(3) Railroad passenger equipment subject to part 238 of this chapter.

* * * * *

§ 216.3 [Amended]

3. Section 216.3(b) is amended by removing the phrase ''section 206 of the Federal Railroad Safety Act of 1970 (45 U.S.C. 435)'' and adding in its place the phrase ''49 U.S.C. 20105''.

§ 216.5 [Amended]

4. Section 216.5(c) is amended by adding after ''216.13,'': ''216.14,''.

§ 216.13 [Amended]

5. The first sentence of § 216.13(a) is removed and a new sentence is added in its place to read as follows: ''When an FRA Motive Power and Equipment Inspector or State Equipment Inspector determines a locomotive is not safe to operate in the service to which it is put, whether by reason of nonconformity with the FRA Railroad Locomotive Safety Standards set forth in part 229 of this chapter or the FRA Railroad Locomotive Inspection Regulations set forth in part 230 of this chapter or by reason of any other condition rendering the locomotive unsafe, he or she will notify the railroad in writing that the locomotive is not in serviceable condition.''

5a. The third sentence of § 216.13(a) is amended by removing the phrase ''part 230'' and adding in its place the phrase ''parts 229 and 230''.

6. Section 216.14 is added to read as follows:

§ 216.14 Special notice for repairs—passenger equipment.

(a) When an FRA Motive Power and Equipment Inspector or a State Equipment Inspector determines that railroad passenger equipment is not in conformity with one or more of the requirements of the FRA Passenger Equipment Safety Standards set forth in part 238 of this chapter and that it is unsafe for further service, he or she will issue a written Special Notice to the railroad that the equipment is not in serviceable condition. The Special Notice describes the defect or defects that cause the equipment to be in unserviceable condition. After receipt of the Special Notice, the railroad shall remove the equipment from service until it is restored to serviceable condition. The equipment may not be deemed in serviceable condition until it complies with all applicable requirements of part 238 of this chapter.

(b) The railroad shall notify in writing the FRA Regional Administrator for the FRA region in which the Special Notice was issued when the equipment is returned to service, specifying the repairs completed.

(c) Railroad passenger equipment subject to a Special Notice may be moved from the place where it was found to be unsafe for further service to the nearest available point where the equipment can be repaired, if such movement is necessary to make the repairs. However, the movement is subject to the further restrictions of §§ 238.15 and 238.17 of this chapter.

§ 216.17 [Amended]

7. Section 216.17(a) is amended as follows:

a. By adding, after ''216.13'', ''216.14,'';

b. By adding, after the word ''locomotive,'' in the third sentence, the phrase ''railroad passenger equipment,''; and

c. By revising the fifth sentence to read as follows:

''If upon reinspection, the railroad freight car, locomotive, or passenger equipment is found to be in serviceable condition, or the track is found to comply with the requirements for the class at which it was previously operated by the railroad, the FRA Regional Administrator or his or her agent will immediately notify the railroad, whereupon the restrictions of the Special Notice cease to be effective.''

Subpart B—[Amended]

8. In subpart B of part 216, the phrases ''the FRA Regional Director for Railroad Safety'', ''the FRA Regional Director of Railroad Safety'', ''a Regional Director'' and ''the Regional Director'' are removed, and the phrase ''the FRA Regional Administrator'' is added in their place.

PART 223—[AMENDED]

9. The authority citation for part 223 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20133, 20701–20702, 21301–02, 21304; 49 CFR 1.49(c), (m).

10. Section 223.8 is added to subpart B to read as follows:

§ 223.8 Additional requirements for passenger equipment.

In addition to the requirements contained in this part, requirements for emergency window exits and window safety glazing on passenger equipment, as defined in § 238.5 of this chapter, are also found in part 238 of this chapter.

PART 229—[AMENDED]

11. The authority citation for part 229 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20133, 20137–38, 20143, 20701–03, 21301–02, 21304; 49 CFR 1.49(c), (m).

12. Section 229.3 is amended by revising paragraph (a) and adding new paragraphs (c), (d), and (e) to read as follows:

§ 229.3 Applicability.

(a) Except as provided in paragraphs (b) through (e) of this section, this part applies to all standard gage railroads.

(b) * * *

(c) Paragraphs (a) and (b) of § 229.125 do not apply to Tier II passenger equipment as defined in § 238.5 of this chapter (*i.e.*, passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph).

(d) On or after November 8, 1999, paragraphs (a)(1) and (b)(1) of § 229.141 do not apply to ''passenger equipment'' as defined in § 238.5 of this chapter, unless such equipment is excluded from the requirements of §§ 238.203 through 238.219, and § 238.223 of this chapter by operation of § 238.201(a)(2) of this chapter.

(e) Paragraphs (a)(2) through (a)(4), and (b)(2) through (b)(4) of § 229.141 do not apply to ''passenger equipment'' as defined in § 238.5 of this chapter that is placed in service for the first time on or after September 8, 2000, unless such equipment is excluded from the requirements of §§ 238.203 through

238.219, and § 238.223 of this chapter by operation of § 238.201(a)(2) of this chapter.

PART 231—[AMENDED]

13. The authority citation for part 231 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20131, 20301–03, 21301–02, 21304; 49 CFR 1.49(c), (m).

14. Section 231.0 is amended by redesignating paragraphs (c) through (e) as paragraphs (d) through (f), respectively; by revising paragraph (a); and by adding a new paragraph (c) to read as follows:

§ 231.0 Applicability and penalties.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all standard gage railroads.

(b) * * *

(c) Except for the provisions governing uncoupling devices, this part does not apply to Tier II passenger equipment as defined in § 238.5 of this chapter (*i.e.*, passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph).

* * * * *

PART 232—[AMENDED]

15. The authority citation for part 232 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20133, 20141, 20301–03, 20306, 21301–02, 21304; 49 CFR 1.49 (c), (m).

16. Section 232.0 is amended by redesignating paragraphs (c) through (e) as paragraphs (d) through (f), respectively; by revising paragraph (a); and by adding a new paragraph (c) to read as follows:

§ 232.0 Applicability and penalties.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all standard gage railroads.

(b) * * *

(c) Except for §§ 232.2 and 232.21 through 232.25, this part does not apply to a ''passenger train'' or ''passenger equipment'' as defined in § 238.5 of this chapter that is subject to the inspection and testing requirements contained in part 238 of this chapter.

* * * * *

17. Part 238 is added to read as follows:

PART 238—PASSENGER EQUIPMENT SAFETY STANDARDS

Subpart A—General

Subpart B—Safety Planning and General Requirements

Subpart C—Specific Requirements for Tier I Passenger Equipment

Subpart D—Inspection, Testing, and Maintenance Requirements for Tier I Passenger Equipment

Subpart E—Specific Requirements for Tier II Passenger Equipment

Subpart F—Inspection, Testing, and Maintenance Requirements for Tier II Passenger Equipment

Subpart G—Specific Safety Planning Requirements for Tier II Passenger Equipment

Authority: 49 U.S.C. 20103, 20107, 20133, 20141, 20302–03, 20306, and 20701–02; 49 CFR 1.49.

Subpart A—General

§ 238.1 Purpose and scope.

(a) The purpose of this part is to prevent collisions, derailments, and other occurrences involving railroad passenger equipment that cause injury or death to railroad employees, railroad passengers, or the general public; and to

mitigate the consequences of such occurrences to the extent they cannot be prevented.

(b) This part prescribes minimum Federal safety standards for railroad passenger equipment. This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

(c) Railroads to which this part applies shall be responsible for compliance with all of the requirements contained in §§ 238.15, 238.17, 238.19, 238.107, 238.109, and subpart D of this part effective July 12, 2001.

(1) A railroad may request earlier application of the requirements contained in §§ 238.15, 238.17, 238.19, 238.107, 238.109, and subpart D upon written notification to FRA's Associate Administrator for Safety. Such a request shall indicate the railroad's readiness and ability to comply with all of the provisions referenced in paragraph (c) introductory text of this section.

(2) Except for paragraphs (b) and (c) of § 238.309, a railroad may specifically request earlier application of the maintenance and testing provisions contained in §§ 238.309 and 238.311 simultaneously. In order to request earlier application of these two sections, the railroad shall indicate its readiness and ability to comply with all of the provisions contained in both of those sections.

(3) Paragraphs (b) and (c) of § 238.309 shall apply beginning September 9, 1999.

§ 238.3 Applicability.

(a) Except as provided in paragraph (c) of this section, this part applies to all:

(1) Railroads that operate intercity or commuter passenger train service on standard gage track which is part of the general railroad system of transportation; and

(2) Railroads that provide commuter or other short-haul rail passenger train service in a metropolitan or suburban area as described by 49 U.S.C. 20102(1), including public authorities operating passenger train service.

(b) Railroads that permit to be used or hauled on their lines passenger equipment subject to this part, in violation of a power brake provision of this part or a safety appliance provision of this part, are subject to the power brake and safety appliance provisions of this part with respect to such operations.

(c) This part does not apply to:

(1) Rapid transit operations in an urban area that are not connected to the general railroad system of transportation;

(2) A railroad that operates only on track inside an installation that is not part of the general railroad system of transportation;

(3) Tourist, scenic, historic, or excursion operations, whether on or off the general railroad system of transportation; or

(4) Circus trains.

§ 238.5 Definitions.

As used in this part—

AAR means the Association of American Railroads.

APTA means the American Public Transit Association.

Administrator means the Administrator of the Federal Railroad Administration or the Administrator's delegate.

Alerter means a device or system installed in the locomotive cab to promote continuous, active locomotive engineer attentiveness by monitoring select locomotive engineer-induced control activities. If fluctuation of a monitored locomotive engineer-induced control activity is not detected within a predetermined time, a sequence of audible and visual alarms is activated so as to progressively prompt a response by the locomotive engineer. Failure by the locomotive engineer to institute a change of state in a monitored control, or acknowledge the alerter alarm activity through a manual reset provision, results in a penalty brake application that brings the locomotive or train to a stop.

Anti-climbing mechanism means the parts at the ends of adjoining vehicles in a train that are designed to engage when subjected to large buff loads to prevent the override of one vehicle by another.

Bind means restrict the intended movement of one or more brake system components by obstruction, increased friction, or reduced clearance.

Block of cars means one car or multiple cars in a solid unit coupled together for the purpose of being added to, or removed from, a train as a solid unit.

Brake, air or *power brake* means a combination of devices operated by compressed air, arranged in a system, and controlled manually, electrically, or pneumatically, by means of which the motion of a rail car or locomotive is retarded or arrested.

Brake, disc means a retardation system used on some rail vehicles, primarily passenger equipment, that utilizes flat metal discs as the braking surface instead of the wheel tread.

Brake, dynamic means a train braking system whereby the kinetic energy of a moving train is used to generate electric current at the locomotive traction motors, which is then dissipated through banks of resistor grids or back into the catenary or third rail system.

Brake, effective means a brake that is capable of producing its required design retarding force on the train. A rail car's air brake is not considered effective if its piston travel is in excess of the maximum prescribed limits.

Brake indicator means a device, actuated by brake cylinder pressure, which indicates whether brakes are applied or released.

Brake, inoperative means a primary brake that, for any reason, no longer applies or releases as intended or is otherwise ineffective.

Brake, on-tread friction means a braking system that uses a brake shoe that acts on the tread of the wheel to retard the vehicle.

Brake, parking or hand brake means a brake that can be applied and released by hand to prevent movement of a stationary rail car or locomotive.

Brake pipe means the system of piping (including branch pipes, angle cocks, cutout cocks, dirt collectors, hoses, and hose couplings) used for connecting locomotives and all rail cars for the passage of air to control the locomotive and car brakes.

Brake, power means ''air brake'' as that term is defined in this section.

Brake, primary means those components of the train brake system necessary to stop the train within the signal spacing distance without thermal damage to friction braking surfaces.

Brake, secondary means those components of the train brake system which develop supplemental brake retarding force that is not needed to stop the train within signal spacing distances or to prevent thermal damage to friction braking surfaces.

Brake shoes or pads aligned with tread or disc means that the surface of the brake shoe or pad, respectively, engages the surface of the wheel tread or disc, respectively, to prevent localized thermal stress.

Braking system, blended means a braking system where the primary brake and one or more secondary brakes are automatically combined to stop the train. If the secondary brakes are unavailable, the blended brake uses the primary brake alone to stop the train.

Calendar day means a time period running from one midnight to the next midnight on a given date.

Class I brake test means a complete passenger train brake system test and inspection (as further specified in § 238.313) performed by a qualified

maintenance person to ensure that the air brake system is 100 percent effective.

Class IA brake test means a test and inspection (as further specified in § 238.315) performed by a qualified person of the air brake system on each car in a passenger train to ensure that the brakes apply and release on each car in the train in response to train line commands.

Class II brake test means a test and inspection (as further specified in § 238.317) performed by a qualified person of brake pipe integrity and continuity from the controlling locomotive to the rear unit of a passenger train.

Collision posts means structural members of the end structures of a vehicle that extend vertically from the underframe to which they are securely attached and that provide protection to occupied compartments from an object penetrating the vehicle during a collision.

Control valves means that part of the air brake equipment on each rail car or locomotive that controls the charging, application, and release of the air brakes, in response to train line commands.

Corner posts means structural members located at the intersection of the front or rear surface with the side surface of a rail vehicle and which extend vertically from the underframe to the roof. Corner posts may be combined with collision posts to become part of the end structure.

Crack means a fracture without complete separation into parts, except that, in a casting, a shrinkage crack or hot tear that does not significantly diminish the strength of the member is not a crack.

Crash energy management means an approach to the design of rail passenger equipment which controls the dissipation of energy during a collision to protect the occupied volumes from crushing and to limit the decelerations on passengers and crewmembers in those volumes. This may be accomplished by designing energy-absorbing structures of low strength in the unoccupied volumes of a rail vehicle or passenger train to collapse in a controlled manner, while providing higher structural strength in the occupied volumes. Energy deflection can also be part of a crash energy management approach. Crash energy management can be used to help provide anti-climbing resistance and to reduce the risk of train buckling during a collision.

Crash refuge means a volume with structural strength designed to maximize the survivability of crewmembers stationed in the locomotive cab during a collision.

Crewmember means a railroad employee called to perform service covered by the Federal hours of service laws at 49 U.S.C. 21103 and subject to the railroad's operating rules and program of operational tests and inspections required in § 217.9 and § 217.11 of this chapter.

Critical buckling stress means the minimum stress necessary to initiate buckling of a structural member.

Emergency brake application means an irretrievable brake application resulting in the maximum retarding force available from the train brake system.

Emergency window means that segment of a side-facing glazing panel which has been designed to permit rapid and easy removal in an emergency situation.

End structure means the main support structure projecting upward from the underframe of a locomotive, passenger car, or other rail vehicle. The end structure is securely attached to the underframe at each end of a rail vehicle.

50th -percentile adult male means a person weighing 164 pounds (plus or minus 3 pounds) and possessing the following dimensions: erect sitting height: 35.7 inches (plus or minus 0.1 inch); hip breadth (sitting): 14.7 inches (plus or minus 0.7 inch); hip circumference (sitting): 42 inches; waist circumference (sitting): 32 inches (plus or minus 0.6 inch); chest depth: 9.3 inches (plus or minus 0.2 inch); and chest circumference: 37.4 inches (plus or minus 0.6 inch).

Foul means restrict the intended movement of one or more brake system components because the component is snagged, entangled, or twisted.

FRA means the Federal Railroad Administration.

Fuel tank, external means a fuel containment volume that extends outside the car body structure of a locomotive.

Fuel tank, internal means a fuel containment volume that does not extend outside the car body structure of a locomotive.

Full-height collision post, corner post, or side frame post means any vertical framing member in the rail car body structure that spans the distance between the underframe and the roof at the car body section where the post is located. For collision posts located at the approximate third points laterally of an end frame, the term ''full-height'' applies to posts that extend and connect to supporting structural members in the roof at the location of the posts, or to a beam connected to the top of the end-frame and supported by the roof rails (or anti-telescoping plate), or to both.

Full service application means a brake application which results in a brake cylinder pressure at the service limiting valve setting or equivalent.

Glazing, end-facing means a glazing panel located where a line perpendicular to the exterior surface of the panel makes an angle of 50 degrees or less with the longitudinal center line of the rail vehicle in which the panel is installed. A glazing panel that curves so as to meet the definition for both side-facing and end-facing glazing is considered end-facing glazing.

Glazing, exterior means a glazing panel that is an integral part of the exterior skin of a rail vehicle and has a surface exposed to the outside environment.

Glazing, side-facing means a glazing panel located where a line perpendicular to the exterior surface of the panel makes an angle of more than 50 degrees with the longitudinal center line of the rail vehicle in which the panel is installed.

Handrails means safety appliances installed on either side of a rail vehicle's exterior doors to assist passengers and crewmembers to safely board and depart the vehicle.

Head end power means power generated on board the locomotive of a passenger train used for purposes other than propelling the train, such as cooking, heating, illumination, ventilation and air conditioning.

In passenger service/in revenue service means a train or passenger equipment that is carrying, or available to carry, passengers. Passengers need not have paid a fare in order for the equipment to be considered in passenger or in revenue service.

In service, when used in connection with passenger equipment, means:

(1) Passenger equipment subject to this part that is in passenger or revenue service; and

(2) All other passenger equipment subject to this part, unless the passenger equipment:

(i) Is being handled in accordance with §§ 238.15, 238.17, 238.305(c)(5), or 238.503(f), as applicable;

(ii) Is in a repair shop or on a repair track;

(iii) Is on a storage track and is not carrying passengers; or

(iv) Has been delivered in interchange but has not been accepted by the receiving railroad.

Interior fitting means any component in the passenger compartment which is mounted to the floor, ceiling, sidewalls, or end walls and projects into the passenger compartment more than 25

mm (1 in.) from the surface or surfaces to which it is mounted. Interior fittings do not include side and end walls, floors, door pockets, or ceiling lining materials, for example.

Lateral means the horizontal direction perpendicular to the direction of travel.

Locomotive means a piece of on-track rail equipment, other than hi-rail, specialized maintenance, or other similar equipment, which may consist of one or more units operated from a single control stand with one or more propelling motors designed for moving other passenger equipment; with one or more propelling motors designed to transport freight or passenger traffic, or both; or without propelling motors but with one or more control stands. This term does not include a locomotive propelled by steam power unless it is used to haul an intercity or commuter passenger train. Nor does this term include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Locomotive cab means the compartment or space on board a locomotive where the control stand is located and which is normally occupied by the engineer when the locomotive is operated.

Locomotive, cab car means rail rolling equipment intended to provide transportation for members of the general public that is without propelling motors but equipped with one or more control stands.

Locomotive, controlling means the locomotive from which the locomotive engineer exercises control over the train.

Locomotive, MU means rail rolling equipment self-propelled by any power source and intended to provide transportation for members of the general public; however, this term does not include an MU locomotive propelled by steam power unless it is used to haul an intercity or commuter passenger train.

Longitudinal means in a direction parallel to the normal direction of travel.

Luminescent material means material that absorbs light energy when ambient levels of light are high and emits this stored energy when ambient levels of light are low, making the material appear to glow in the dark.

L/V ratio means the ratio of the lateral force that any wheel exerts on an individual rail to the vertical force exerted by the same wheel on the rail.

MIL–STD–882C means a military standard issued by the United States Department of Defense to provide uniform requirements for developing and implementing a system safety plan and program to identify and then eliminate the hazards of a system or reduce the associated risk to an acceptable level.

Monocoque means a type of rail vehicle construction where the shell or skin acts as a single unit with the supporting frame to resist and transmit the loads acting on the rail vehicle.

Mph means miles per hour.

95th -percentile adult male means, except as used in § 238.447(f)(2), a person weighing 215 pounds and possessing the following dimensions: erect sitting height: 38 inches; hip breadth (sitting): 16.5 inches; hip circumference (sitting): 47.2 inches; waist circumference (sitting): 42.5 inches; chest depth: 10.5 inches; and chest circumference 44.5 inches.

Occupied volume means the volume of a rail vehicle or passenger train where passengers or crewmembers are normally located during service operation, such as the operating cab and passenger seating and sleeping areas. The entire width of a vehicle's end compartment that contains a control stand is an occupied volume. A vestibule is typically not considered occupied, except when it contains a control stand for use as a control cab.

Ordered, as applied to acquisition of equipment, means that the acquiring entity has given a notice to proceed to manufacture the equipment that represents a firm financial commitment to compensate the manufacturer for the contract price of the equipment or for damages if the order is nullified. Equipment is not ordered if future exercise of a contract option is required to place the remanufacturing process in motion.

Override means to climb over the normal coupling or side buffers and linking mechanism and impact the end of the adjoining rail vehicle or unit above the underframe.

Passenger car means rail rolling equipment intended to provide transportation for members of the general public and includes a self-propelled car designed to carry passengers, baggage, mail, or express. This term includes a passenger coach, cab car, and an MU locomotive. In the context of articulated equipment, ''passenger car'' means that segment of the rail rolling equipment located between two trucks. This term does not include a private car.

Passenger coach means rail rolling equipment intended to provide transportation for members of the general public that is without propelling motors and without a control stand.

Passenger equipment—means

(1) All powered and unpowered passenger cars, locomotives used to haul a passenger car, and any other rail rolling equipment used in a train with one or more passenger cars. Passenger equipment includes—

(i) A passenger coach,

(ii) A cab car,

(iii) A MU locomotive,

(iv) A locomotive not intended to provide transportation for a member of the general public that is used to power a passenger train, and

(v) Any non-self-propelled vehicle used in a passenger train, including an express car, baggage car, mail car, freight car, or a private car.

(2) In the context of articulated equipment, ''passenger equipment'' means a segment of rail rolling equipment located between two trucks that is used in a train with one or more passenger cars. This term does not include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Passenger station means a location designated in a railroad's timetable where passengers are regularly scheduled to get on or off any train.

Permanent deformation means the undergoing of a permanent change in shape of a structural member of a rail vehicle.

Person means an entity of any type covered under 1 U.S.C. 1, including but not limited to the following: a railroad; a manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor.

Piston travel means the amount of linear movement of the air brake hollow rod (or equivalent) or piston rod when forced outward by movement of the piston in the brake cylinder or actuator and limited by the brake shoes being forced against the wheel or disc.

Power car means a rail vehicle that propels a Tier II passenger train or is the lead vehicle in a Tier II passenger train, or both.

Pre-revenue service acceptance testing plan means a document, as further specified in § 238.111, prepared by a railroad that explains in detail how pre-revenue service tests of passenger equipment demonstrate that the equipment meets Federal safety standards and the railroad's own safety requirements.

Primary responsibility means the task that a person performs at least 50 percent of the time. The totality of the circumstances will be considered on a case-by-case basis in circumstances

where an individual does not spend 50 percent of his or her day engaged in any one readily identifiable type of activity.

Private car means rail rolling equipment that is used only for excursion, recreational, or private transportation purposes. A private car is not a passenger car.

Public highway-rail grade crossing means a location where a public highway, road or street, including associated sidewalks or pathways, crosses one or more active railroad tracks at grade.

Qualified maintenance person means a qualified person who has received, as a part of the training, qualification, and designation program required under § 238.109, instruction and training that includes ''hands-on'' experience (under appropriate supervision or apprenticeship) in one or more of the following functions: troubleshooting, inspection, testing, maintenance, or repair of the specific train brake and other components and systems for which the person is assigned responsibility. This person shall also possess a current understanding of what is required to properly repair and maintain the safety-critical brake or mechanical components for which the person is assigned responsibility. Further, the qualified maintenance person shall be a person whose primary responsibility includes work generally consistent with the above-referenced functions and is designated to:

(1) Conduct Class I brake tests under this part;

(2) Conduct exterior calendar day mechanical inspections on MU locomotives or other passenger cars and unpowered vehicles under this part; or

(3) Determine whether equipment not in compliance with this part may be moved as required by § 238.17.

Qualified person means a person determined by a railroad to have the knowledge and skills necessary to perform one or more functions required under this part. The railroad determines the qualifications and competencies for employees designated to perform various functions in the manner set forth in this part.

Railroad means any form of nonhighway ground transportation that runs on rails or electromagnetic guideways and any entity providing such transportation, including—

(i) Commuter or other short-haul railroad passenger service in a metropolitan or suburban area and commuter railroad service that was operated by the Consolidated Rail Corporation on January 1, 1979; and

(ii) High speed ground transportation systems that connect metropolitan areas, without regard to whether those systems use new technologies not associated with traditional railroads; but does not include rapid transit operations in an urban area that are not connected to the general railroad system of transportation.

Refresher training means periodic retraining required by a railroad for employees or contractors to remain qualified to perform specific equipment inspection, testing, or maintenance functions.

Repair point means a location designated by a railroad where repairs of the type necessary occur on a regular basis. A repair point has, or should have, the facilities, tools, and personnel qualified to make the necessary repairs. A repair point need not be staffed continuously.

Respond as intended means to produce the result that a device or system is designed to produce.

Rollover strength means the strength provided to protect the structural integrity of a rail vehicle in the event the vehicle leaves the track and impacts the ground on its side or roof.

Roof rail means the longitudinal structural member at the intersection of the side wall and the roof sheathing.

Running brake test means a test (as further specified in § 238.319) performed by a qualified person of a train system or component while the train is in motion to verify that the system or component functions as intended.

Running gear defect means any condition not in compliance with this part which involves a truck component, a propulsion system component, a draft system component, a wheel, or a wheel component.

Safety appliance means an appliance required under 49 U.S.C. chapter 203, excluding power brakes. The term includes automatic couplers, hand brakes, sill steps, handholds, handrails, or ladder treads made of steel or a material of equal or greater mechanical strength used by the traveling public or railroad employees that provide a means for safely coupling, uncoupling, or ascending or descending passenger equipment.

Safety-critical means a component, system, or task that, if not available, defective, not functioning, not functioning correctly, not performed, or not performed correctly, increases the risk of damage to passenger equipment or injury to a passenger, crewmember, or other person.

Semi-permanently coupled means coupled by means of a drawbar or other coupling mechanism that requires tools to perform the uncoupling operation. Coupling and uncoupling of each semi-permanently coupled unit in a train can be performed safely only while at a maintenance or shop location where personnel can safely get under a unit or between units.

Shear strength means the ability of a structural member to resist forces or components of forces acting perpendicular to compression or tension forces, or both, in the member.

Shock absorbent material means material designed to prevent or mitigate injuries due to impact by yielding and absorbing much of the energy of impact.

Side posts means main vertical structural elements in the sides of a rail vehicle.

Side sill means that portion of the underframe or side at the bottom of the rail vehicle side wall.

Single car test means a comprehensive test (as further specified in § 238.311) of the functioning of all critical brake system components installed on an individual passenger car or unpowered vehicle, other than a self-propelled passenger car, used or allowed to be used in a passenger train.

Single car test device means a device capable of controlling the application and release of the brakes on an individual passenger car or an unpowered vehicle, other than a self-propelled passenger car, through pneumatic or electrical means.

Skin means the outer covering of a fuel tank and a rail vehicle. The skin may be covered with another coating of material such as fiberglass.

Spall, glazing means small pieces of glazing that fly off the back surface of the glazing when an object strikes the front surface.

Switching service means the classification of freight cars according to commodity or destination; assembling of cars for train movements; changing the position of cars for purposes of loading, unloading, or weighing; placing of locomotives and cars for repair or storage; or moving of rail equipment in connection with work service that does not constitute a train movement.

Telescope means override an adjoining rail vehicle or unit and penetrate into the interior of that adjoining vehicle or unit because of compressive forces.

Terminal means a starting point or ending point of a single scheduled trip for a train, where passengers may get on or off a train. Normally, this location is a point where the train would reverse direction or change destinations.

Tier I means operating at speeds not exceeding 125 mph.

Tier II means operating at speeds exceeding 125 mph but not exceeding 150 mph.

Tourist, scenic, historic, or excursion operations means railroad operations that carry passengers, often using antiquated equipment, with the conveyance of the passengers to a particular destination not being the principal purpose.

Trailer car means a rail vehicle that neither propels a Tier II passenger train nor is the leading unit in a Tier II passenger train. A trailer car is normally without a control stand and is normally occupied by passengers.

Train means a locomotive unit or locomotive units coupled, with or without cars. For the purposes of the provisions of this part related to power brakes, the term ''train'' does not include such equipment when being used in switching service.

Train brake communication line means the communication link between the locomotive and passenger equipment in a train by which the brake commands are transmitted. This may be a pneumatic pipe, electrical line, or radio signal.

Train, commuter means a passenger train providing commuter service within an urban, suburban, or metropolitan area. The term includes a passenger train provided by an instrumentality of a State or a political subdivision of a State.

Train, long-distance intercity passenger means a passenger train that provides service between large cities more than 125 miles apart and is not operated exclusively in the National Railroad Passenger Corporation's Northeast Corridor.

Train, passenger means a train that transports or is available to transport members of the general public. If a train is composed of a mixture of passenger and freight equipment, that train is a passenger train for purposes of this part.

Train, short-distance intercity passenger means a passenger train that provides service exclusively on the National Railroad Passenger Corporation's Northeast Corridor or between cities that are not more than 125 miles apart.

Train, Tier II passenger means a short-distance or long-distance intercity passenger train providing service at speeds that include those exceeding 125 mph but not exceeding 150 mph.

Trainset, passenger means a passenger train.

Transverse means in a direction perpendicular to the normal direction of travel.

Ultimate strength means the load at which a structural member fractures or ceases to resist any load.

Uncoupling mechanism means the arrangement for operating the coupler by any means.

Underframe means the lower horizontal support structure of a rail vehicle.

Unit means passenger equipment of any type, except a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Unoccupied volume means the volume of a rail vehicle or passenger train which does not contain seating and is not normally occupied by passengers or crewmembers.

Vehicle, rail means passenger equipment of any type and includes a car, trailer car, locomotive, power car, tender, or similar vehicle. This term does not include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Vestibule means an area of a passenger car that normally does not contain seating and is used in passing from the seating area to the side exit doors.

Witness plate means a thin foil placed behind a piece of glazing undergoing an impact test. Any material spalled or broken from the back side of the glazing will dent or mark the witness plate.

Yard means a system of tracks within defined limits provided for the making up of trains, storing of cars, or other purposes.

Yard air test means a train brake system test conducted using a source of compressed air other than a locomotive.

Yield strength means the ability of a structural member to resist a change in length caused by a heavy load. Exceeding the yield strength may cause permanent deformation of the member.

§ 238.7 Waivers.

(a) A person subject to a requirement of this part may petition the Administrator for a waiver of compliance with such requirement. The filing of such a petition does not affect the person's responsibility for compliance with that requirement while the petition is being considered.

(b) Each petition for waiver under this section shall be filed in the manner and contain the information required by part 211 of this chapter.

(c) If the Administrator finds that a waiver of compliance is in the public interest and is consistent with railroad safety, the Administrator may grant the waiver subject to any conditions the Administrator deems necessary.

§ 238.9 Responsibility for compliance.

(a) A railroad subject to this part shall not—

(1) Use, haul, permit to be used or hauled on its line, offer in interchange, or accept in interchange any train or passenger equipment, while in service,

(i) That has one or more conditions not in compliance with a safety appliance or power brake provision of this part; or

(ii) That has not been inspected and tested as required by a safety appliance or power brake provision of this part; or

(2) Use, haul, offer in interchange, or accept in interchange any train or passenger equipment, while in service,

(i) That has one or more conditions not in compliance with a provision of this part, other than the safety appliance and power brake provisions of this part, if the railroad has actual knowledge of the facts giving rise to the violation, or a reasonable person acting in the circumstances and exercising reasonable care would have that knowledge; or

(ii) That has not been inspected and tested as required by a provision of this part, other than the safety appliance and power brake provisions of this part, if the railroad has actual knowledge of the facts giving rise to the violation, or a reasonable person acting in the circumstances and exercising reasonable care would have that knowledge; or

(3) Violate any other provision of this part.

(b) For purposes of this part, passenger equipment will be considered in use prior to departure but after it has received, or should have received, the inspection required under this part for movement and is deemed ready for passenger service.

(c) Although the duties imposed by this part are generally stated in terms of the duty of a railroad, any person as defined in § 238.5, including a contractor for a railroad, who performs any function covered by this part must perform that function in accordance with this part.

§ 238.11 Penalties.

(a) Any person, as defined in § 238.5, who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least $500 and not more than $11,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed $22,000 per violation may be assessed. Each day a violation continues shall

constitute a separate offense. See Appendix A to this part for a statement of agency civil penalty policy.

(b) Any person who knowingly and willfully falsifies a record or report required by this part may be subject to criminal penalties under 49 U.S.C. 21311.

§ 238.13 Preemptive effect.

Under 49 U.S.C. 20106, issuance of the regulations in this part preempts any State law, regulation, or order covering the same subject matter, except an additional or more stringent law, regulation, or order that is necessary to eliminate or reduce an essentially local safety hazard; that is not incompatible with a law, regulation, or order of the United States Government; and that does not unreasonably burden interstate commerce.

§ 238.15 Movement of passenger equipment with power brake defects.

Beginning July 12, 2001 the following provisions of this section apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c) of this part.

(a) *General.* This section contains the requirements for moving passenger equipment with a power brake defect without liability for a civil penalty under this part. Railroads remain liable for the movement of passenger equipment under 49 U.S.C. 20303(c). For purposes of this section, § 238.17, and § 238.503, a ''power brake defect'' is a condition of a power brake component, or other primary brake component, that does not conform with this part. (Passenger cars and other passenger equipment classified as locomotives under part 229 of this chapter are also covered by the movement restrictions contained in § 229.9 of this chapter for those defective conditions covered by part 229 of this chapter.)

(b) *Limitations on movement of passenger equipment containing a power brake defect found during a Class I or IA brake test.* Except as provided in paragraph (c) of this section (which addresses brakes that become defective en route after a Class I or IA brake test was performed), a commuter or passenger train that has in its consist passenger equipment containing a power brake defect found during a Class I or IA brake test (or, for Tier II trains, the equivalent) may only be moved, without civil penalty liability under this part—

(1) If all of the following conditions are met:

(i) The train is moved for purposes of repair, without passengers;

(ii) The applicable operating restrictions in paragraphs (d) and (e) of this section are observed; and

(iii) The passenger equipment is tagged, or information is recorded, as prescribed in paragraph (c)(2) of this section; or

(2) If the train is moved for purposes of scrapping or sale of the passenger equipment that has the power brake defect and all of the following conditions are met:

(i) The train is moved without passengers;

(ii) The movement is at a speed of 15 mph or less; and

(iii) The movement conforms with the railroad's air brake or power brake instructions.

(c) *Limitations on movement of passenger equipment in passenger service that becomes defective en route after a Class I or IA brake test.* Passenger equipment hauled or used in service in a commuter or passenger train that develops a power brake defect while en route to another location after receiving a Class I or IA brake test (or, for Tier II trains, the equivalent) may be hauled or used by a railroad for repair, without civil penalty liability under this part, if the applicable operating restrictions set forth in paragraphs (d) and (e) of this section are complied with and all of the following requisites are satisfied:

(1) *En route defect.* At the time of the train's Class I or IA brake test, the passenger equipment in the train was properly equipped with power brakes that comply with this part. The power brakes on the passenger equipment become defective while it is en route to another location.

(2) *Record.* At the place where the railroad first discovers the defect, a tag or card is placed on both sides of the defective passenger equipment, or an automated tracking system is provided, with the following information about the defective passenger equipment:

(i) The reporting mark and car or locomotive number;

(ii) The name of the inspecting railroad;

(iii) The name of the inspector;

(iv) The inspection location and date;

(v) The nature of each defect;

(vi) The destination of the equipment where it will be repaired; and

(vii) The signature, if possible, and job title of the person reporting the defective condition.

(3) *Automated tracking system.* Automated tracking systems used to meet the tagging requirements contained in paragraph (c)(2) of this section may be reviewed and monitored by FRA at any time to ensure the integrity of the system. FRA's Associate Administrator for Safety may prohibit or revoke a railroad's ability to utilize an automated tracking system in lieu of tagging if FRA finds that the automated tracking system is not properly secure, is inaccessible to FRA or a railroad's employees, or fails to adequately track or monitor the movement of defective equipment. Such a determination will be made in writing and will state the basis for such action.

(4) *Conditional requirement.* In addition, if an en route failure causes power brakes to be cut out or renders the brake inoperative on passenger equipment, the railroad shall:

(i) Determine the percentage of operative power brakes in the train based on the number of brakes known to be cut out or otherwise inoperative, using the formula specified in paragraph (d)(1) of this section;

(ii) Notify the person responsible for the movement of trains of the percent of operative brakes and movement restrictions on the train imposed by paragraph (d) of this section;

(iii) Notify the mechanical department of the failure; and

(iv) Confirm the percentage of operative brakes by a walking inspection at the next location where the railroad reasonably judges that it is safe to do so.

(d) *Operating restrictions based on percent operative power brakes in train.*

(1) *Computation of percent operative power brakes.*

(i) Except as specified in paragraphs (d)(1)(ii) and (iii) of this section, the percentage of operative power brakes in a train shall be determined by dividing the number of axles in the train with operative power brakes by the total number of axles in the train.

(ii) For equipment with tread brake units (TBUs), the percentage of operative power brakes shall be determined by dividing the number of operative TBUs by the total number of TBUs.

(iii) Each cut-out axle on a locomotive that weighs more than 200,000 pounds shall be counted as two cut-out axles for the purposes of calculating the percentage of operative brakes. Unless otherwise specified by the railroad, the friction braking effort over all other axles shall be considered uniform.

(iv) The following brake conditions not in compliance with this part are not considered inoperative power brakes for purposes of this section:

(A) Failure or cutting out of secondary brake systems;

(B) Inoperative or otherwise defective handbrakes or parking brakes;

(C) Excessive piston travel that does not render the power brakes ineffective; and

(D) Power brakes overdue for inspection, testing, maintenance, or stenciling under this part.

(2) *All passenger trains developing 50–74 percent operative power brakes.* A passenger train that develops inoperative power brake equipment resulting in at least 50 percent but less than 75 percent operative power brakes may be used only as follows:

(i) The train may be moved in passenger service only to the next forward passenger station;

(ii) The speed of the train shall be restricted to 20 mph or less; and

(iii) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(3) *Commuter, short-distance intercity, and short-distance Tier II passenger trains developing 75–99 percent operative power brakes.*

(i) *75–84 percent operative brakes.* Commuter, short-distance intercity, and short-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 75 percent but less than 85 percent operative brakes may be used only as follows:

(A) The train may be moved in passenger service only to the next forward location where the necessary repairs can be made; however, if the next forward location where the necessary repairs can be made does not have the facilities to handle the safe unloading of passengers, the train may be moved past the repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) The speed of the train shall be restricted to 50 percent of the train's maximum allowable speed or 40 mph, whichever is less; and

(C) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(ii) *85–99 percent operative brakes.* Commuter, short-distance intercity, and short-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 85 percent but less than 100 percent operative brakes may only be used as follows:

(A) The train may be moved in passenger service only to the next forward location where the necessary repairs can be made; however, if the next forward location where the necessary repairs can be made does not have the facilities to handle the safe unloading of passengers, the train may be moved past the repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(4) *Long-distance intercity and long-distance Tier II passenger trains developing 75–99 operative power brakes.*

(i) *75–84 percent operative brakes.* Long-distance intercity and long-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 75 percent but less than 85 percent operative brakes may be used only if all of the following restrictions are observed:

(A) The train may be moved in passenger service only to the next forward repair location identified for repair of that equipment by the railroad operating the equipment in the list required by § 238.19(d); however, if the next forward repair location does not have the facilities to handle the safe unloading of passengers, the train may be moved past the designated repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) The speed of the train shall be restricted to 50 percent of the train's maximum allowable speed or 40 mph, whichever is less; and

(C) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(ii) *85–99 percent operative brakes.* Long-distance intercity and long-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 85 percent but less than 100 percent operative brakes may be used only if all of the following restrictions are observed:

(A) The train may be moved in passenger service only to the next forward repair location identified for repair of that equipment by the railroad operating the equipment in the list required by § 238.19(d); however, if the next forward repair location does not have the facilities to handle the safe unloading of passengers, the train may be moved past the designated repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(e) *Operating restrictions on passenger trains with inoperative power brakes on the front or rear unit.* If the power brakes on the front or rear unit in any passenger train are completely inoperative the following shall apply:

(1) If the handbrake is located inside the interior of the car:

(i) A qualified person shall be stationed at the handbrake on the unit;

(ii) The car shall be locked-out and empty except for the railroad employee manning the handbrake; and

(iii) Appropriate speed restrictions shall be placed on the train by a qualified person;

(2) If the handbrake is located outside the interior of the car or is inaccessible to a qualified person:

(i) The car shall be locked-out and empty;

(ii) The train shall be operated at restricted speed not to exceed 20 mph; and

(iii) The car shall be removed from the train or repositioned in the train at the first location where it is possible to do so.

(f) *Special Notice for Repair.* Nothing in this section authorizes the movement of passenger equipment subject to a Special Notice for Repair under part 216 of this chapter unless the movement is made in accordance with the restrictions contained in the Special Notice.

§ 238.17 Movement of passenger equipment with other than power brake defects.

Beginning July 12, 2001 the following provisions of this section apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c) of this part.

(a) *General.* This section contains the requirements for moving passenger equipment with other than a power brake defect. (Passenger cars and other passenger equipment classified as locomotives under part 229 of this chapter are also covered by the movement restrictions contained in § 229.9 of this chapter for those defective conditions covered by part 229 of this chapter.)

(b) *Limitations on movement of passenger equipment containing defects found at time of calendar day inspection.* Except as provided in §§ 238.303(e)(15) and 238.305(c)(5), passenger equipment containing a condition not in conformity with this part at the time of its calendar day mechanical inspection may be moved from that location for repair if all of the following conditions are satisfied:

(1) If the condition involves a running gear defect, the defective equipment is not used in passenger service and is moved in a non-revenue train;

(2) If the condition involves a non-running gear defect, the defective equipment may be used in passenger service in a revenue train provided that a qualified maintenance person determines that it is safe to do so, and if so, the car is locked out and empty, and all movement restrictions are observed except that the car may be occupied by a member of the train crew or a railroad employee to the extent necessary to safely operate the train;

(3) The requirements of paragraphs (c)(3) and (c)(4) of this section are met; and

(4) The special requirements of paragraph (e) of this section, if applicable, are met.

(c) *Usual limitations on movement of passenger equipment that develops defects en route.* Except as provided in §§ 238.303(e)(15) and 238.503(f), passenger equipment that develops en route to its destination, after its calendar day inspection was performed and before its next calendar day mechanical inspection is performed, any defect not in compliance with this part, other than a power brake defect, may be moved only if the railroad complies with all of the following requirements and, if applicable, the special requirements in paragraph (e) of this section:

(1) Prior to movement of equipment with a potential running gear defect, a qualified maintenance person shall determine if it is safe to move the equipment in passenger service and, if so, the maximum speed and other restrictions necessary for safely conducting the movement. If appropriate, these determinations may be made based upon a description of the defective condition provided by a crewmember. If the determinations required by this paragraph are made by an off-site qualified maintenance person based on a description of the defective condition by on-site personnel, then a qualified maintenance person shall perform a physical inspection of the defective equipment, at the first location possible, to verify the description of the defect provided by the on-site personnel.

(2) Prior to movement of equipment with a non-running gear defect, a qualified person or a qualified maintenance person shall determine if it is safe to move the equipment in passenger service and, if so, the maximum speed and other restrictions necessary for safely conducting the movement. If appropriate, these determinations may be made based upon a description of the defective condition provided by the on-site personnel.

(3) Prior to movement of any defective equipment, the qualified person or qualified maintenance person shall notify the crewmember in charge of the movement of the defective equipment, who in turn shall inform all other crewmembers of the presence of the defective condition(s) and the maximum speed and other restrictions determined under paragraph (c)(1) or (c)(2) of this section. The movement shall be made in conformance with such restrictions.

(4) The railroad shall maintain a record of all defects reported and their subsequent repair in the defect tracking system required in § 238.19. In addition, prior to movement of the defective equipment, a tag or card placed on both sides of the defective equipment, or an automated tracking system, shall record the following information about the defective equipment:

(i) The reporting mark and car or locomotive number;

(ii) The name of the inspecting railroad;

(iii) The name of the inspector, inspection location, and date;

(iv) The nature of each defect;

(v) Movement restrictions and safety restrictions, if any;

(vi) The destination of the equipment where it will be repaired; and

(vii) The signature, if possible, as well as the job title and location of the person making the determinations required by this section.

(5) *Automated tracking system.* Automated tracking systems used to meet the tagging requirements contained in paragraph (c)(4) of this section may be reviewed and monitored by FRA at any time to ensure the integrity of the system. FRA's Associate Administrator for Safety may prohibit or revoke a railroad's ability to utilize an automated tracking system in lieu of tagging if FRA finds that the automated tracking system is not properly secure, is inaccessible to FRA or a railroad's employees, or fails to adequately track or monitor the movement of defective equipment. Such a determination will be made in writing and will state the basis for such action.

(6) After a qualified maintenance person or a qualified person verifies that the defective equipment is safe to remain in service as required in paragraphs (c)(1) and (c)(2) of this section, the defective equipment that develops a condition not in compliance with this part while en route may continue in passenger service not later than the next calendar day mechanical inspection, if the requirements of this paragraph are otherwise fully met.

(d) *Inspection of roller bearings on equipment involved in a derailment.*

(1) A railroad shall not continue passenger equipment in service that has a roller bearing whose truck was involved in a derailment unless the bearing has been inspected and tested by:

(i) Visual examination to determine whether it shows any sign of damage; and

(ii) Spinning freely its wheel set or manually rotating the bearing to determine whether the bearing makes any unusual noise.

(2) The roller bearing shall be disassembled from the axle and inspected internally if:

(i) It shows any external sign of damage;

(ii) It makes any unusual noise when its wheel set is spun freely or the bearing is manually rotated;

(iii) Its truck was involved in a derailment at a speed of more than 10 miles per hour; or

(iv) Its truck was dragged on the ground for more than 200 feet.

(e) *Special requisites for movement of passenger equipment with safety appliance defects.* Consistent with 49 U.S.C. 20303, passenger equipment with a safety appliance not in compliance with this part or with part 231 of this chapter, if applicable, may be moved—

(1) If necessary to effect repair of the safety appliance;

(2) From the point where the safety appliance defect was first discovered by the railroad to the nearest available location on the railroad where the necessary repairs required to bring the passenger equipment into compliance can be made or, at the option of the receiving railroad, the equipment may be received and hauled for repair to a point on the receiving railroad's line that is no farther than the point on the delivering railroad's line where the repair of the defect could have been made;

(3) If a tag placed on both sides of the passenger equipment or an automated tracking system contains the information required under paragraph (c)(4) of this section; and

(4) After notification of the crewmember in charge of the movement of the defective equipment, who in turn shall inform all other crewmembers of the presence of the defective condition(s).

(f) *Special Notice for Repair.* Nothing in this section authorizes the movement of equipment subject to a Special Notice for Repair under part 216 of this chapter unless the movement is made in accordance with the restrictions contained in the Special Notice.

§ 238.19 Reporting and tracking defective passenger equipment.

(a) *General.* Beginning July 12, 2001 each railroad shall have in place a reporting and tracking system for passenger equipment with a defect not in conformance with this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c) of this part. The reporting and tracking system shall record the following information:

(1) The identification number of the defective equipment;

(2) The date the defect occurred;

(3) The nature of the defect;

(4) The determination made by a qualified person or qualified maintenance person on whether the equipment is safe to run;

(5) The name of the qualified person or qualified maintenance person making such a determination;

(6) Any operating restrictions placed on the equipment; and

(7) Repairs made and the date that they were made.

(b) *Retention of records.* At a minimum, each railroad shall keep the records described in paragraph (a) of this section for one periodic maintenance interval for each specific type of equipment as described in the railroad's inspection, testing, and maintenance plan required by § 238.107. FRA strongly encourages railroads to keep these records for longer periods of time because they form the basis for future reliability-based decisions concerning test and maintenance intervals that may be developed pursuant to § 238.307(b).

(c) *Availability of records.* Railroads shall make defect reporting and tracking records available to FRA upon request.

(d) *List of power brake repair points.* Railroads operating long-distance intercity and long-distance Tier II passenger equipment shall designate locations, in writing, where repairs to passenger equipment with a power brake defect will be made and shall provide the list to FRA's Associate Administrator for Safety and make it available to FRA for inspection and copying upon request. Railroads operating these trains shall designate a sufficient number of repair locations to ensure the safe and timely repair of passenger equipment. These designations shall not be changed without at least 30 days' advance written notice to FRA's Associate Administrator for Safety.

§ 238.21 Special approval procedure.

(a) *General.* The following procedures govern consideration and action upon requests for special approval of alternative standards under §§ 238.103, 238.223, 238.309, 238.311, 238.405, or 238.427; for approval of alternative compliance under § 238.201; and for special approval of pre-revenue service acceptance testing plans as required by § 238.111. (Requests for approval of programs for the inspection, testing, and maintenance of Tier II passenger equipment are governed by § 238.505.)

(b) *Petitions for special approval of alternative standard.* Each petition for special approval of an alternative standard shall contain—

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition;

(2) The alternative proposed, in detail, to be substituted for the particular requirements of this part;

(3) Appropriate data or analysis, or both, establishing that the alternative will provide at least an equivalent level of safety; and

(4) A statement affirming that the railroad has served a copy of the petition on designated representatives of its employees, together with a list of the names and addresses of the persons served.

(c) *Petitions for special approval of alternative compliance.* Each petition for special approval of alternative compliance shall contain—

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to the petition;

(2) The elements prescribed in § 238.201(b); and

(3) A statement affirming that the railroad has served a copy of the petition on designated representatives of its employees, together with a list of the names and addresses of the persons served.

(d) *Petitions for special approval of pre-revenue service acceptance testing plan.*

(1) Each petition for special approval of a pre-revenue service acceptance testing plan shall contain—

(i) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition; and

(ii) The elements prescribed in § 238.111.

(2) Three copies of each petition for special approval of the pre-revenue service acceptance testing plan shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., N.W., Mail Stop 25, Washington, D.C. 20590.

(e) **Federal Register** *notice.* FRA will publish a notice in the **Federal Register** concerning each petition under paragraphs (b) and (c) of this section.

(f) *Comment.* Not later than 30 days from the date of publication of the notice in the **Federal Register** concerning a petition under paragraphs (b) or (c) of this section, any person may comment on the petition.

(1) Each comment shall set forth specifically the basis upon which it is made, and contain a concise statement of the interest of the commenter in the proceeding.

(2) Three copies of each comment shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., Mail Stop 25, Washington, D. C. 20590.

(3) The commenter shall certify that a copy of the comment was served on each petitioner.

(g) *Disposition of petitions.*

(1) FRA will conduct a hearing on a petition in accordance with the procedures provided in § 211.25 of this chapter.

(2) If FRA finds that the petition complies with the requirements of this section or that the proposed plan is acceptable or changes are justified, or both, the petition will be granted, normally within 90 days of its receipt. If the petition is neither granted nor denied within 90 days, the petition remains pending for decision. FRA may attach special conditions to the approval of the petition. Following the approval of a petition, FRA may reopen consideration of the petition for cause stated.

(3) If FRA finds that the petition does not comply with the requirements of this section, or that the proposed plan is not acceptable or that the proposed changes are not justified, or both, the petition will be denied, normally within 90 days of its receipt.

(4) When FRA grants or denies a petition, or reopens consideration of the petition, written notice is sent to the petitioner and other interested parties.

§ 238.23 Information collection.

(a) The information collection requirements of this part were reviewed by the Office of Management and Budget pursuant to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et. seq.*) and are assigned OMB control number 2130–0544.

(b) The information collection requirements are found in the following sections: §§ 238.1, 238.7, 238.11, 238.15, 238.17, 238.19, 238.21, 238.103, 238.105, 238.107, 238.109, 238.111, 238.201, 238.203, 238.211, 238.223, 238.231, 238.237, 238.301, 238.303, 238.305, 238.307, 238.309, 238.311, 238.313, 238.315, 238.317, 238.403, 238.405, 238.421, 238.423, 238.427, 238.431, 238.437, 238.441, 238.445, 238.447, 238.503, 238.505, and 238.603.

Subpart B—Safety Planning and General Requirements

§ 238.101 Scope.

This subpart contains safety planning and general safety requirements for all railroad passenger equipment subject to this part.

§ 238.103 Fire safety.

(a) *Materials.* (1) Materials used in constructing a passenger car or a cab of a locomotive ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall meet the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part, or alternative standards issued or recognized by an expert consensus organization after special approval of FRA under § 238.21.

(2) On or after November 8, 1999, materials introduced in a passenger car or a locomotive cab, as part of any kind of rebuild, refurbishment, or overhaul of the car or cab, shall meet the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part, or alternative standards issued or recognized by an expert consensus organization after special approval of FRA under § 238.21.

(b) *Certification.* A railroad shall require certification that a representative sample of combustible materials to be—

(1) Used in constructing a passenger car or a locomotive cab, or

(2) Introduced in a passenger car or a locomotive cab, as part of any kind of rebuild, refurbishment, or overhaul of the car or cab, has been tested by a recognized independent testing laboratory and that the results show the representative sample complies with the requirements of paragraph (a) of this section at the time it was tested.

(c) *Fire safety analysis for procuring new passenger equipment.* In procuring new passenger equipment, each railroad shall ensure that fire safety considerations and features in the design of the equipment reduce the risk of personal injury and equipment damage caused by fire to an acceptable level using MIL–STD–882C as a guide or an alternative, formal safety methodology. To this end, each railroad shall complete a written fire safety analysis for the passenger equipment being procured. In conducting the analysis, the railroad shall—

(1) Take effective steps to design the equipment to be sufficiently fire resistant so that fire detection devices permit evacuation of all passengers and crewmembers before fire, smoke, or toxic fumes cause injury to any passenger or crewmember.

(2) Identify, analyze, and prioritize the fire hazards inherent in the design of the equipment.

(3) Reasonably ensure that a ventilation system in the equipment does not contribute to the lethality of a fire.

(4) Identify in writing any train component that is a risk of initiating fire and which requires overheat protection. An overheat detector shall be installed in any component when the analysis determines that an overheat detector is necessary.

(5) Identify in writing any unoccupied train compartment that contains equipment or material that poses a fire hazard, and analyze the benefit provided by including a fire or smoke detection system in each compartment so identified. A fire or smoke detector shall be installed in any unoccupied compartment when the analysis determines that such equipment is necessary to ensure sufficient time for the safe evacuation of passengers and crewmembers from the train. For purposes of this section, an unoccupied train compartment means any part of the equipment structure that is not normally occupied during operation of the train, including a closet, baggage compartment, food pantry, etc.

(6) Determine whether any occupied or unoccupied space requires a portable fire extinguisher and, if so, the proper type and size of the fire extinguisher for each location. As required by § 239.101 of this chapter, each passenger car is required to have a minimum of one portable fire extinguisher. If the analysis performed indicates that one or more additional portable fire extinguishers are needed, such shall be installed.

(7) On a case-by-case basis, the railroad shall analyze the benefit provided by including a fixed, automatic fire-suppression system in any unoccupied train compartment that contains equipment or material that poses a fire hazard, and determine the proper type and size of the automatic fire-suppression system for each location. A fixed, automatic fire suppression system shall be installed in any unoccupied compartment when the analysis determines that such equipment is practical and necessary to ensure sufficient time for the safe evacuation of passengers and crewmembers from the train.

(8) Describe the analysis and testing necessary to—

(i) Demonstrate that the fire protection approach taken in the design of the equipment will meet the fire protection requirements of this part, and

(ii) Select materials which help provide sufficient fire resistance to reasonably ensure adequate time to detect a fire and safely evacuate the passengers and crewmembers.

(9) Explain how safety issues are resolved in relation to cost and performance issues in the design of the equipment to reduce the risk of each fire hazard.

(d) *Fire safety analysis for existing passenger equipment.* (1) Not later than July 10, 2000, each passenger railroad shall complete a preliminary fire safety analysis for each category of existing rail equipment and current rail service.

(2) Not later than July 10, 2001, each such railroad shall—

(i) Complete a final fire safety analysis for any category of existing passenger equipment and service evaluated during the preliminary fire safety analysis as likely presenting an unacceptable risk of personal injury. In conducting the analysis, the railroad shall consider the extent to which materials comply with the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part or alternative standards approved by FRA under this part.

(ii) Take remedial action to reduce the risk of personal injuries to an acceptable level in any such category, if the railroad finds the risk to be unacceptable. In considering remedial action, a railroad is not required to replace material found not to comply with the test performance criteria for flammability and smoke emission characteristics required by this part, if:

(A) The risk of personal injuries from the material is negligible based on the railroad's operating environment and the material's size, or location, or both; or

(B) The railroad takes alternative action which reduces the risk of personal injuries to an acceptable level.

(3) Not later than July 10, 2003, each such railroad shall—

(i) Complete a fire safety analysis for all categories of equipment and service. In completing this analysis, the railroad shall, as far as practicable, determine the extent to which remaining materials comply with the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part or alternative standards approved by FRA under this part.

(ii) Take remedial action to reduce the risk of personal injuries to an acceptable level in any such category, if the railroad finds the risk to be unacceptable. In considering remedial action, a railroad is not required to replace material found not to comply with the test performance criteria for flammability and smoke emission characteristics required by this part, if:

(A) The risk of personal injuries from the material is negligible based on the railroad's operating environment and the material's size, or location, or both; or

(B) The railroad takes alternative action which reduces the risk of personal injuries to an acceptable level.

(4) Where possible prior to transferring existing equipment to a new category of service, but in no case more than 90 days following such a transfer, the passenger railroad shall complete a new fire safety analysis taking into consideration the change in railroad operations and shall effect prompt action to reduce any identified risk to an acceptable level.

(5) As used in this paragraph, ''category of rail equipment and current rail service'' shall be determined by the railroad based on relevant fire safety risks, including available ignition sources, presence or absence of heat/smoke detection systems, known variations from the required material test performance criteria or alternative standards approved by FRA, and availability of rapid and safe egress to the exterior of the vehicle under conditions secure from fire, smoke, and other hazards.

(e) *Inspection, testing, and maintenance.* Each railroad shall develop and adopt written procedures for the inspection, testing, and maintenance of all fire safety systems and fire safety equipment on the passenger equipment it operates. The railroad shall comply with those procedures that it designates as mandatory for the safety of the equipment and its occupants.

§ 238.105 Train hardware and software safety.

These requirements of this section apply to hardware and software used to control or monitor safety functions in passenger equipment ordered on or after September 8, 2000, and such components implemented or materially modified in new or existing passenger equipment on or after September 9, 2002.

(a) The railroad shall develop and maintain a written hardware and software safety program to guide the design, development, testing, integration, and verification of computer software and hardware that controls or monitors equipment safety functions.

(b) The hardware and software safety program shall be based on a formal safety methodology that includes a Failure Modes, Effects, Criticality Analysis (FMECA); verification and validation testing for all hardware and software components and their interfaces; and comprehensive hardware and software integration testing to ensure that the software functions as intended.

(c) Under the hardware and software safety program, software that controls or monitors safety functions shall be considered safety-critical unless a completely redundant, failsafe, non-software means ensuring the same function is provided. The hardware and software safety program shall include a description of how the following will be accomplished, achieved, carried out, or implemented to ensure software safety and reliability:

(1) The software design process;

(2) The software design documentation;

(3) The software hazard analysis;

(4) Software safety reviews;

(5) Software hazard monitoring and tracking;

(6) Hardware and software integration safety tests; and

(7) Demonstration of overall software safety as part of the pre-revenue service tests of equipment.

(d) Hardware and software that controls or monitors passenger equipment safety functions shall include design feature(s) that result in a safe condition in the event of a computer hardware or software failure.

(e) The railroad shall comply with the elements of its hardware and software safety program that affect the safety of the passenger equipment.

§ 238.107 Inspection, testing, and maintenance plan.

(a) *General.* Beginning July 12, 2001 the following provisions of this section apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c).

(b) Each railroad shall develop, and provide to FRA upon request, a detailed inspection, testing, and maintenance plan consistent with the requirements of this part. This plan shall include a detailed description of the following:

(1) Inspection procedures, intervals, and criteria;

(2) Test procedures and intervals;

(3) Scheduled preventive maintenance intervals;

(4) Maintenance procedures; and

(5) Special testing equipment or measuring devices required to perform inspections and tests.

(c) The inspection, testing, and maintenance plan required by this section is not intended to address and should not include procedures to address employee working conditions that arise in the course of conducting the inspections, tests, and maintenance set forth in the plan. When requesting a copy of the railroad's plan, FRA does not intend to review any portion of the plan that relates to employee working conditions.

(d) The inspection, testing, and maintenance plan required by this section shall be reviewed by the railroad annually.

§ 238.109 Training, qualification, and designation program.

(a) Beginning July 12, 2001 each railroad shall have adopted a training, qualification, and designation program for employees and contractors that perform safety-related inspections, tests, or maintenance of passenger equipment, and trained such employees and contractors in accordance with the program. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c). For purposes of this section, a ''contractor'' is defined as a person under contract with the railroad or an employee of a person under contract with the railroad to perform any of the tasks required by this part.

(b) As part of this program, the railroad shall, at a minimum:

(1) Identify the tasks related to the inspection, testing, and maintenance that must be performed on each type of equipment that the railroad operates;

(2) Develop written procedures for the performance of the tasks identified;

(3) Identify the skills and knowledge necessary to perform each task;

(4) Develop or incorporate a training curriculum that includes classroom and

''hands-on'' lessons designed to impart the skills and knowledge identified as necessary to perform each task. The developed or incorporated training curriculum shall specifically address the Federal regulatory requirements contained in this part that are related to the performance of the tasks identified;

(5) Require all employees and contractors to successfully complete the training course that covers the equipment and tasks for which they are responsible as well as the specific Federal regulatory requirements contained in this part related to equipment and tasks for which they are responsible;

(6) Require all employees and contractors to pass a written examination covering the equipment and tasks for which they are responsible as well as the specific Federal regulatory requirements contained in this part related to equipment and tasks for which they are responsible;

(7) Require all employees and contractors to individually demonstrate ''hands-on'' capability to successfully perform the tasks required to be performed as part of their duties on the type equipment to which they are assigned;

(8) Require supervisors to complete the program that covers the employees whom they supervise, including refresher training;

(9) Require supervisors to exercise oversight to ensure that all the identified tasks are performed in accordance with the railroad's written procedures;

(10) Designate in writing that each employee and contractor has the knowledge and skills necessary to perform the safety-related tasks that are part of his or her job;

(11) Require periodic refresher training at an interval not to exceed three years that includes classroom and ''hands-on'' training, as well as testing;

(12) Add new equipment to the qualification and designation program prior to its introduction to revenue service; and

(13) Maintain records adequate to demonstrate that each employee and contractor performing safety-related tasks on passenger equipment is currently qualified to do so. These records shall be adequate to distinguish the qualifications of the employee or contractor as a qualified person or as a qualified maintenance person.

§ 238.111 Pre-revenue service acceptance testing plan.

(a) *Passenger equipment that has previously been used in revenue service in the United States.* For passenger equipment that has previously been used in revenue service in the United States, each railroad shall test the equipment on its system prior to placing such equipment in revenue service for the first time on its railroad to ensure the compatibility of the equipment with the railroad's operating system (including the track, and signal system). A description of such testing shall be retained by the railroad and made available to FRA for inspection and copying upon request. For purposes of this paragraph, passenger equipment that has previously been used in revenue service in the United States means:

(1) The actual equipment used in such service;

(2) Equipment manufactured identically to that actual equipment; and

(3) Equipment manufactured similarly to that actual equipment with no material differences in safety-critical components or systems.

(b) *Passenger equipment that has not been used in revenue service in the United States.* Before using passenger equipment for the first time on its system that has not been used in revenue service in the United States, each railroad shall:

(1) Prepare a pre-revenue service acceptance testing plan for the equipment which contains the following elements:

(i) An identification of any waivers of FRA or other Federal safety regulations required for the testing or for revenue service operation of the equipment;

(ii) A clear statement of the test objectives. One of the principal test objectives shall be to demonstrate that the equipment meets the safety requirements specified in this part when operated in the environment in which it is to be used;

(iii) A planned schedule for conducting the testing;

(iv) A description of the railroad property or facilities to be used to conduct the testing;

(v) A detailed description of how the testing is to be conducted, including a description of the criteria to be used to evaluate the equipment's performance;

(vi) A description of how the test results are to be recorded;

(vii) A description of any special instrumentation to be used during the tests;

(viii) A description of the information or data to be obtained;

(ix) A description of how the information or data obtained is to be analyzed or used;

(x) A description of any criteria to be used as safety limits during the testing;

(xi) A description of the criteria to be used to measure or determine the success or failure of the tests. If acceptance is to be based on extrapolation of less than full-level testing results, the analysis to be done to justify the validity of the extrapolation shall be described;

(xii) Quality control procedures to ensure that the inspection, testing, and maintenance procedures are followed;

(xiii) Criteria to be used for the revenue service operation of the equipment; and

(xiv) A description of any testing of the equipment that has previously been performed.

(2) Submit a copy of the plan to FRA at least 30 days prior to testing the equipment and include with that submission notification of the times and places of the pre-revenue service tests to permit FRA observation of such tests. For Tier II passenger equipment, the railroad shall obtain FRA approval of the plan under the procedures specified in § 238.21.

(3) Comply with the plan, including fully executing the tests required by the plan.

(4) Document in writing the results of the tests. For Tier II passenger equipment, the railroad shall report the results of the tests to the FRA Associate Administrator for Safety at least 90 days prior to its intended operation of the equipment in revenue service.

(5) Correct any safety deficiencies identified in the design of the equipment or in the inspection, testing, and maintenance procedures, uncovered during the testing. If safety deficiencies cannot be corrected by design changes, the railroad shall impose operational limitations on the revenue service operation of the equipment that are designed to ensure that the equipment can operate safely. For Tier II passenger equipment, the railroad shall comply with any operational limitations imposed by the FRA Associate Administrator for Safety on the revenue service operation of the equipment for cause stated following FRA review of the results of the test program. This section does not restrict a railroad from petitioning FRA for a waiver of a safety regulation under the procedures specified in part 211 of this chapter.

(6) Make the plan and documentation kept pursuant to that plan available for inspection and copying by FRA upon request.

(7) For Tier II passenger equipment, obtain approval from the FRA Associate Administrator for Safety prior to placing the equipment in revenue service. The Associate Administrator grants such approval upon a showing of the

railroad's compliance with the applicable requirements of this part.

(c) If a railroad plans a major upgrade or introduction of new technology on Tier II passenger equipment that has been used in revenue service in the United States and that affects a safety system on such equipment, the railroad shall follow the procedures specified in paragraph (b) of this section prior to placing the equipment in revenue service with such a major upgrade or introduction of new technology.

§ 238.113 Emergency window exits.

(a) The following requirements apply on or after Novermber 8, 1999—

(1) Each passenger car shall have a minimum of four emergency window exits, either in a staggered configuration where practical or with one exit located in each end of each side of the passenger car. If the passenger car has multiple levels, each main level shall have a minimum of four emergency window exits, either in a staggered configuration where practical or with one exit located in each end of each side on each level.

(2) Each sleeping car, and any similarly designed car having a number of separate compartments intended to be occupied by passengers or train crewmembers, shall have at least one emergency window exit in each compartment.

(3) Each emergency window exit shall be designed to permit rapid and easy removal during an emergency situation without requiring the use of a tool or other implement.

(b) Each emergency window exit in a passenger car, including a sleeper car, ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall have a minimum unobstructed opening with dimensions of 26 inches horizontally by 24 inches vertically.

(c) *Marking and instructions.* [Reserved]

§ 238.115 Emergency lighting.

(a) This section applies to each passenger car ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002. This section applies to each level of a multi-level passenger car.

(b) Emergency lighting shall be provided in each passenger car and shall include the following:

(1) A minimum, average illumination level of 1 foot-candle measured at floor level adjacent to each exterior door and each interior door providing access to an exterior door (such as a door opening into a vestibule);

(2) A minimum, average illumination level of 1 foot-candle measured 25 inches above floor level along the center of each aisle and passageway;

(3) A minimum illumination level of 0.1 foot-candle measured 25 inches above floor level at any point along the center of each aisle and passageway; and

(4) A back-up power system capable of:

(i) Operating in all equipment orientations within 45 degrees of vertical;

(ii) Operating after the initial shock of a collision or derailment resulting in the following individually applied accelerations:

(A) Longitudinal: 8g;

(B) Lateral: 4g; and

(C) Vertical: 4g; and

(iii) Operating all emergency lighting for a period of at least 90 minutes without a loss of more than 40% of the minimum illumination levels specified in this paragraph (b).

§ 238.117 Protection against personal injury.

On or after November 8, 1999, all moving parts, high voltage equipment, electrical conductors and switches, and pipes carrying hot fluids or gases on all passenger equipment shall be appropriately equipped with interlocks or guards to minimize the risk of personal injury. This section does not apply to the interior of a private car.

§ 238.119 Rim-stamped straight-plate wheels.

(a)(1) Except as provided in paragraph (a)(2) of this section, on or after November 8, 1999, no railroad shall place or continue in service any vehicle, other than a private car, that is equipped with a rim-stamped straight-plate wheel if a brake shoe acts on the tread of the wheel for the purpose of slowing the vehicle.

(2) A commuter railroad may continue in service a vehicle equipped with a Class A, rim-stamped straight-plate wheel mounted on an inboard-bearing axle until the railroad exhausts its replacement stock of wheels held as of May 12, 1999, provided the railroad does not modify the operation of the vehicle in any way that would result in increased thermal input to the wheel during braking.

(b) A rim-stamped straight-plate wheel shall not be used as a replacement wheel on a private car that operates in a passenger train if a brake shoe acts on the tread of the wheel for the purpose of slowing the car.

(c) The requirements of this section do not apply to a wheel that is periodically tread-braked for a short duration by automatic circuitry for the sole purpose of cleaning the wheel tread surface.

Subpart C—Specific Requirements for Tier I Passenger Equipment

§ 238.201 Scope/alternative compliance.

(a) *Scope.* (1) This subpart contains requirements for railroad passenger equipment operating at speeds not exceeding 125 miles per hour. As stated in § 238.229, all such passenger equipment remains subject to the safety appliance requirements contained in Federal statute at 49 U.S.C. chapter 203 and in FRA regulations at part 231 and § 232.2 of this chapter. Unless otherwise specified, these requirements only apply to passenger equipment ordered on or after September 8, 2000 or placed in service for the first time on or after September 9, 2002.

(2) The structural standards of this subpart (§ 238.203B-static end strength; § 238.205—anti-climbing mechanism; § 238.207—link between coupling mechanism and car body; § 238.209—forward-facing end structure of locomotives; § 238.211—collision posts; § 238.213—corner posts; § 238.215—rollover strength; § 238.217—side structure; § 238.219—truck-to-car-body attachment; and § 238.223—locomotive fuel tanks) do not apply to passenger equipment if used exclusively on a rail line:

(i) With no public highway-rail grade crossings;

(ii) On which no freight operations occur at any time;

(iii) On which only passenger equipment of compatible design is utilized; and

(iv) On which trains operate at speeds not exceeding 79 mph.

(b) *Alternative compliance.* Passenger equipment of special design shall be deemed to comply with this subpart, other than § 238.203, for the service environment in which the petitioner proposes to operate the equipment if the FRA Associate Administrator for Safety determines under paragraph (c) of this section that the equipment provides at least an equivalent level of safety in such environment with respect to the protection of its occupants from serious injury in the case of a derailment or collision. In making a determination under paragraph (c) the Associate Administrator shall consider, as a whole, all of those elements of casualty prevention or mitigation relevant to the integrity of the equipment that are addressed by the requirements of this subpart.

(c)(1) The Associate Administrator may only make a finding of equivalent safety and compliance with this subpart,

other than § 238.203, based upon a submission of data and analysis sufficient to support that determination. The petition shall include:

(i) The information required by § 238.21(c);

(ii) Information, including detailed drawings and materials specifications, sufficient to describe the actual construction of the equipment of special design;

(iii) Engineering analysis sufficient to describe the likely performance of the equipment in derailment and collision scenarios pertinent to the safety requirements for which compliance is required and for which the equipment does not conform to the specific requirements of this subpart; and

(iv) A quantitative risk assessment, incorporating the design information and engineering analysis described in this paragraph, demonstrating that the equipment, as utilized in the service environment for which recognition is sought, presents no greater hazard of serious personal injury than equipment that conforms to the specific requirements of this subpart.

(2) Any petition made under this paragraph is subject to the procedures set forth in § 238.21, and will be disposed of in accordance with § 238.21(g).

§ 238.203 Static end strength.

(a)(1) Except as further specified in this paragraph or in paragraph (d), on or after November 8, 1999 all passenger equipment shall resist a minimum static end load of 800,000 pounds applied on the line of draft without permanent deformation of the body structure.

(2) For a passenger car or a locomotive, the static end strength of unoccupied volumes may be less than 800,000 pounds if:

(i) Energy absorbing structures are used as part of a crash energy management design of the passenger car or locomotive, and

(ii) The passenger car or locomotive resists a minimum static end load of 800,000 pounds applied on the line of draft at the ends of its occupied volume without permanent deformation of the body structure.

(3) For a locomotive placed in service prior to November 8, 1999, as an alternative to resisting a minimum static end load of 800,000 pounds applied on the line of draft without permanent deformation of the body structure, the locomotive shall resist a horizontal load of 1,000,000 pounds applied along the longitudinal center line of the locomotive at a point on the buffer beam construction 12 inches above the center line of draft without permanent deformation of the body structure. The application of this load shall not be distributed over an area greater than 6 inches by 24 inches. The alternative specified in this paragraph is not applicable to a cab car or an MU locomotive.

(4) The requirements of this paragraph do not apply to:

(i) A private car; or

(ii) Unoccupied passenger equipment operating at the rear of a passenger train.

(b) Passenger equipment placed in service before November 8, 1999 is presumed to comply with the requirements of paragraph (a)(1) of this section, unless the railroad operating the equipment has knowledge, or FRA makes a showing, that such passenger equipment was not built to the requirements specified in paragraph (a)(1).

(c) When overloaded in compression, the body structure of passenger equipment shall be designed, to the maximum extent possible, to fail by buckling or crushing, or both, of structural members rather than by fracture of structural members or failure of structural connections.

(d) *Grandfathering of non-compliant equipment for use on a specified rail line or lines.*

(1) *Grandfathering approval is equipment and line specific.* Grandfathering approval of non-compliant equipment under this paragraph is limited to usage of the equipment on a particular rail line or lines. Before grandfathered equipment can be used on another rail line, a railroad must file and secure approval of a grandfathering petition under paragraph (d)(3) of this section.

(2) *Temporary usage of non-compliant equipment.* Any passenger equipment placed in service on a rail line or lines before November 8, 1999 that does not comply with the requirements of paragraph (a)(1) may continue to be operated on that particular line or (those particular lines) if the operator of the equipment files a petition seeking grandfathering approval under paragraph (d)(3) before November 8, 1999. Such usage may continue while the petition is being processed, but in no event later than May 8, 2000, unless the petition is approved.

(3) *Petitions for grandfathering.* Petitions for grandfathering shall include:

(i) The name, title, address, and telephone number of the primary person to be contacted with respect to the petition;

(ii) Information, including detailed drawings and material specifications, sufficient to describe the actual construction of the equipment;

(iii) Engineering analysis sufficient to describe the likely performance of the static end strength of the equipment and the likely performance of the equipment in derailment and collision scenarios pertinent to the equipment's static end strength;

(iv) A description of risk mitigation measures that will be employed in connection with the usage of the equipment on a specified rail line or lines to decrease the likelihood of accidents involving the use of the equipment; and

(v) A quantitative risk assessment, incorporating the design information, engineering analysis, and risk mitigation measures described in this paragraph, demonstrating that the use of the equipment, as utilized in the service environment for which recognition is sought, is in the public interest and is consistent with railroad safety.

(e) *Service.* Three copies of each petition shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., Mail Stop 25, Washington, D.C. 20590.

(f) **Federal Register** *notice.* FRA will publish a notice in the **Federal Register** concerning each petition under paragraph (d) of this section.

(g) *Comment.* Not later than 30 days from the date of publication of the notice in the **Federal Register** concerning a petition under paragraph (d) of this section, any person may comment on the petition.

(1) Each comment shall set forth specifically the basis upon which it is made, and contain a concise statement of the interest of the commenter in the proceeding.

(2) Three copies of each comment shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., Mail Stop 25, Washington, D. C. 20590.

(3) The commenter shall certify that a copy of the comment was served on each petitioner.

(h) *Disposition of petitions.*

(1) FRA will conduct a hearing on a petition in accordance with the procedures provided in § 211.25 of this chapter.

(2) If FRA finds that the petition complies with the requirements of this section and that the proposed usage is in the public interest and consistent with railroad safety, the petition will be granted, normally within 90 days of its receipt. If the petition is neither granted nor denied within 90 days, the petition remains pending for decision. FRA may

attach special conditions to the approval of the petition. Following the approval of a petition, FRA may reopen consideration of the petition for cause stated.

(3) If FRA finds that the petition does not comply with the requirements of this section or that the proposed usage is not in the public interest and consistent with railroad safety, the petition will be denied, normally within 90 days of its receipt.

(4) When FRA grants or denies a petition, or reopens consideration of the petition, written notice is sent to the petitioner and other interested parties.

§ 238.205 Anti-climbing mechanism.

(a) Except as provided in paragraph (b) of this section, all passenger equipment placed in service for the first time on or after September 8, 2000 shall have at both the forward and rear ends an anti-climbing mechanism capable of resisting an upward or downward vertical force of 100,000 pounds without failure. When coupled together in any combination to join two vehicles, AAR Type H and Type F tight-lock couplers satisfy this requirement.

(b) Each locomotive ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall have an anti-climbing mechanism at its forward end capable of resisting an upward or downward vertical force of 200,000 pounds without failure, in lieu of the forward end anti-climbing mechanism requirements described in paragraph (a) of this section.

§ 238.207 Link between coupling mechanism and car body.

All passenger equipment placed in service for the first time on or after September 8, 2000 shall have a coupler carrier at each end designed to resist a vertical downward thrust from the coupler shank of 100,000 pounds for any normal horizontal position of the coupler, without permanent deformation. For passenger equipment that is connected by articulated joints that comply with the requirements of § 238.205(a), such passenger equipment also complies with the requirements of this section.

§ 238.209 Forward-facing end structure of locomotives.

The skin covering the forward-facing end of each locomotive shall be:

(a) Equivalent to a ½ inch steel plate with a 25,000 pounds-per-square-inch yield strength—material of a higher yield strength may be used to decrease the required thickness of the material provided at least an equivalent level of strength is maintained;

(b) Designed to inhibit the entry of fluids into the occupied cab area of the equipment; and

(c) Affixed to the collision posts or other main vertical structural members of the forward end structure so as to add to the strength of the end structure.

(d) As used in this section, the term ''skin'' does not include forward-facing windows and doors.

§ 238.211 Collision posts.

(a) Except as further specified in this paragraph and paragraphs (b) and (c) of this section—

(1) All passenger equipment placed in service for the first time on or after September 8, 2000 shall have either:

(i) Two full-height collision posts, located at approximately the one-third points laterally. Each collision post shall have an ultimate longitudinal shear strength of not less than 300,000 pounds at a point even with the top of the underframe member to which it is attached. If reinforcement is used to provide the shear value, the reinforcement shall have full value for a distance of 18 inches up from the underframe connection and then taper to a point approximately 30 inches above the underframe connection; or

(ii) An equivalent end structure that can withstand the sum of forces that each collision post in paragraph (a)(1)(i) of this section is required to withstand. For analysis purposes, the required forces may be assumed to be evenly distributed at the end structure at the underframe joint.

(2) The requirements of this paragraph do not apply to unoccupied passenger equipment operating in a passenger train.

(b) Each locomotive, including a cab car and an MU locomotive, ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall have at its forward end, in lieu of the structural protection described in paragraph (a) of this section, either:

(1) Two forward collision posts, located at approximately the one-third points laterally, each capable of withstanding:

(i) A 500,000-pound longitudinal force at the point even with the top of the underframe, without exceeding the ultimate strength of the joint; and

(ii) A 200,000-pound longitudinal force exerted 30 inches above the joint of the post to the underframe, without exceeding the ultimate strength; or

(2) An equivalent end structure that can withstand the sum of the forces that each collision post in paragraph (b)(1)(i) of this section is required to withstand.

(c) The end structure requirements in paragraphs (a) and (b) of this section apply only to the ends of a semi-permanently coupled consist of articulated units, provided that:

(1) The railroad submits to the FRA Associate Administrator for Safety under the procedures specified in § 238.21 a documented engineering analysis establishing that the articulated connection is capable of preventing disengagement and telescoping to the same extent as equipment satisfying the anti-climbing and collision post requirements contained in this subpart; and

(2) FRA finds the analysis persuasive.

§ 238.213 Corner posts.

(a) Each passenger car shall have at each end of the car, placed ahead of the occupied volume, two full-height corner posts capable of resisting:

(1) A horizontal load of 150,000 pounds at the point of attachment to the underframe without failure;

(2) A horizontal load of 20,000 pounds at the point of attachment to the roof structure without failure; and

(3) A horizontal load of 30,000 pounds applied 18 inches above the top of the floor without permanent deformation.

(b) For purposes of this section, the orientation of the applied horizontal loads shall range from longitudinal inward to transverse inward.

§ 238.215 Rollover strength.

(a) Each passenger car shall be designed to rest on its side and be uniformly supported at the top (''roof rail''), the bottom cords (''side sill'') of the side frame, and, if bi-level, the intermediate floor rail. The allowable stress in the structural members of the occupied volumes for this condition shall be one-half yield or one-half the critical buckling stress, whichever is less. Local yielding to the outer skin of the passenger car is allowed provided that the resulting deformations in no way intrude upon the occupied volume of the car.

(b) Each passenger car shall also be designed to rest on its roof so that any damage in occupied areas is limited to roof sheathing and framing. Other than roof sheathing and framing, the allowable stress in the structural members of the occupied volumes for this condition shall be one-half yield or one-half the critical buckling stress, whichever is less. Deformation to the roof sheathing and framing is allowed to the extent necessary to permit the vehicle to be supported directly on the top chords of the side frames and end frames.

§ 238.217 Side structure.

Each passenger car shall comply with the following:

(a) *Side posts and corner braces.*

(1) For modified girder, semi-monocoque, or truss construction, the sum of the section moduli in inches ^{3}—about a longitudinal axis, taken at the weakest horizontal section between the side sill and side plate—of all posts and braces on each side of the car located between the body corner posts shall be not less than 0.30 multiplied by the distance in feet between the centers of end panels.

(2) For modified girder or semi-monocoque construction only, the sum of the section moduli in inches ^{3}—about a transverse axis, taken at the weakest horizontal section between the side sill and side plate—of all posts, braces and pier panels, to the extent available, on each side of the car located between body corner posts shall be not less than 0.20 multiplied by the distance in feet between the centers of end panels.

(3) The center of an end panel is the point midway between the center of the body corner post and the center of the adjacent side post.

(4) The minimum section moduli or thicknesses specified in paragraph (a) of this section may be adjusted in proportion to the ratio of the yield strength of the material used to that of mild open-hearth steel for a car whose structural members are made of a higher strength steel.

(b) *Sheathing.*

(1) Outside sheathing of mild, open-hearth steel when used flat, without reinforcement (other than side posts) in a side frame of modified girder or semi-monocoque construction shall not be less than 1/8 inch nominal thickness. Other metals may be used of a thickness in inverse proportion to their yield strengths.

(2) Outside metal sheathing of less than ⅛ inch thickness may be used only if it is reinforced so as to produce at least an equivalent sectional area at a right angle to reinforcements as that of the flat sheathing specified in paragraph (b)(1) of this section.

(3) When the sheathing used for truss construction serves no load-carrying function, the minimum thickness of that sheathing shall be not less than 40 percent of that specified in paragraph (b)(1) of this section.

§ 238.219 Truck-to-car-body attachment.

Passenger equipment shall have a truck-to-car-body attachment with an ultimate strength sufficient to resist without failure a force of 2g vertical on the mass of the truck and a force of 250,000 pounds in any horizontal direction on the truck. For purposes of this section, the mass of the truck includes axles, wheels, bearings, the truck-mounted brake system, suspension system components, and any other components attached to the truck by design.

§ 238.221 Glazing.

(a) Passenger equipment shall comply with the applicable Safety Glazing Standards contained in part 223 of this chapter, if required by that part.

(b) Each exterior window on a locomotive cab and a passenger car shall remain in place when subjected to:

(1) The forces described in part 223 of this chapter; and

(2) The forces due to air pressure differences caused when two trains pass at the minimum separation for two adjacent tracks, while traveling in opposite directions, each train traveling at the maximum authorized speed.

§ 238.223 Locomotive fuel tanks.

(a) *External fuel tanks.* External locomotive fuel tanks shall comply with the requirements contained in Appendix D to this part, or an industry standard providing at least an equivalent level of safety if approved by FRA under § 238.21.

(b) *Internal fuel tanks.*

(1) Internal locomotive fuel tanks shall be positioned in a manner to reduce the likelihood of accidental penetration from roadway debris or collision.

(2) Internal fuel tank vent systems shall be designed so they do not become a path of fuel loss in any tank orientation due to a locomotive overturning.

(3) Internal fuel tank bulkheads and skin shall at a minimum be equivalent to a ⅜-inch thick steel plate with a 25,000 pounds-per-square-inch yield strength. Material of a higher yield strength may be used to decrease the required thickness of the material provided at least an equivalent level of strength is maintained. Skid plates are not required.

§ 238.225 Electrical system.

All passenger equipment shall comply with the following:

(a) *Conductors.* Conductor sizes shall be selected on the basis of current-carrying capacity, mechanical strength, temperature, flexibility requirements, and maximum allowable voltage drop. Current-carrying capacity shall be derated for grouping and for operating temperature.

(b) *Main battery system.*

(1) The main battery compartment shall be isolated from the cab and passenger seating areas by a non-combustible barrier.

(2) Battery chargers shall be designed to protect against overcharging.

(3) If batteries are of the type to potentially vent explosive gases, the battery compartment shall be adequately ventilated to prevent the accumulation of explosive concentrations of these gases.

(c) *Power dissipation resistors.*

(1) Power dissipating resistors shall be adequately ventilated to prevent overheating under worst-case operating conditions as determined by the railroad.

(2) Power dissipation grids shall be designed and installed with sufficient isolation to prevent combustion.

(3) Resistor elements shall be electrically insulated from resistor frames, and the frames shall be electrically insulated from the supports that hold them.

(d) *Electromagnetic interference and compatibility.*

(1) The operating railroad shall ensure electromagnetic compatibility of the safety-critical equipment systems with their environment. Electromagnetic compatibility may be achieved through equipment design or changes to the operating environment.

(2) The electronic equipment shall not produce electrical noise that affects the safe performance of train line control and communications or wayside signaling systems.

(3) To contain electromagnetic interference emissions, suppression of transients shall be at the source wherever possible.

(4) All electronic equipment shall be self-protected from damage or improper operation, or both, due to high voltage transients and long-term over-voltage or under-voltage conditions. This includes protection from both power frequency and harmonic effects as well as protection from radio frequency signals into the microwave frequency range.

§ 238.227 Suspension system.

On or after November 8, 1999—

(a) All passenger equipment shall exhibit freedom from hunting oscillations at all operating speeds. If hunting oscillations do occur, a railroad shall immediately take appropriate action to prevent derailment. For purposes of this paragraph, hunting oscillations shall be considered lateral oscillations of trucks that could lead to a dangerous instability.

(b) All passenger equipment intended for service above 110 mph shall demonstrate stable operation during pre-revenue service qualification tests at all operating speeds up to 5 mph in

excess of the maximum intended operating speed under worst-case conditions—including component wear—as determined by the operating railroad.

(c) Nothing in this section shall affect the requirements of part 213 of this chapter as they apply to passenger equipment as provided in that part.

§ 238.229 Safety appliances.

Except as provided in this part, all passenger equipment continues to be subject to the safety appliance requirements contained in Federal statute at 49 U.S.C. chapter 203 and in Federal regulations at part 231 and § 232.2 of this chapter.

§ 238.231 Brake system.

Except as otherwise provided in this section, on or after September 9, 1999 the following requirements apply to all passenger equipment and passenger trains.

(a) A passenger train's primary brake system shall be capable of stopping the train with a service application from its maximum authorized operating speed within the signal spacing existing on the track over which the train is operating.

(b) The brake system design of passenger equipment ordered on or after September 8, 2000 or placed in service for the first time on or after September 9, 2002, shall not require an inspector to place himself or herself on, under, or between components of the equipment to observe brake actuation or release.

(c) Passenger equipment shall be provided with an emergency brake application feature that produces an irretrievable stop, using a brake rate consistent with prevailing adhesion, passenger safety, and brake system thermal capacity. An emergency brake application shall be available at any time, and shall be initiated by an unintentional parting of the train.

(d) A passenger train brake system shall respond as intended to signals from a train brake control line or lines. Control lines shall be designed so that failure or breakage of a control line will cause the brakes to apply or will result in a default to control lines that meet this requirement.

(e) Introduction of alcohol or other chemicals into the air brake system of passenger equipment is prohibited.

(f) The operating railroad shall require that the design and operation of the brake system results in wheels that are free of condemnable cracks.

(g) Disc brakes shall be designed and operated to produce a surface temperature no greater than the safe operating temperature recommended by the disc manufacturer and verified by testing or previous service.

(h) *Hand brakes and parking brakes.*

(1) Except for a locomotive that is ordered before September 8, 2000 or placed in service for the first time before Sepbember 9, 2002, and except for MU locomotives, all locomotives shall be equipped with a hand or parking brake that can:

(i) Be applied or activated by hand;

(ii) Be released by hand; and

(iii) Hold the loaded unit on the maximum grade anticipated by the operating railroad.

(2) Except for a private car and locomotives addressed in paragraph (h)(1) of this section, all other passenger equipment, including MU locomotives, shall be equipped with a hand brake that meets the requirements for hand brakes contained in part 231 of this chapter and that can:

(i) Be applied or activated by hand;

(ii) Be released by hand; and

(iii) Hold the loaded unit on the maximum grade anticipated by the operating railroad.

(i) Passenger cars shall be equipped with a means to apply the emergency brake that is accessible to passengers and located in the vestibule or passenger compartment. The emergency brake shall be clearly identified and marked.

(j) Locomotives equipped with blended brakes shall be designed so that:

(1) The blending of friction and dynamic brake to obtain the correct retarding force is automatic;

(2) Loss of power or failure of the dynamic brake does not result in exceeding the allowable stopping distance;

(3) The friction brake alone is adequate to safely stop the train under all operating conditions; and

(4) Operation of the friction brake alone does not result in thermal damage to wheels or disc rotor surface temperatures exceeding the manufacturer's recommendation.

(k) For new designs of braking systems, the design process shall include computer modeling or dynamometer simulation of train braking that shows compliance with paragraphs (f) and (g) of this section over the range of equipment operating speeds. A new simulation is required prior to implementing a change in operating parameters.

(l) Locomotives ordered on or after September 8, 2000 or placed in service for the first time on or after September 9, 2002, shall be equipped with effective air coolers or dryers that provide air to the main reservoir with a dew point at least 10 degrees F. below ambient temperature.

(m) When a passenger train is operated in either direct or graduated release, the railroad shall ensure that all the cars in the train consist are set up in the same operating mode.

§ 238.233 Interior fittings and surfaces.

(a) Each seat in a passenger car shall—

(1) Be securely fastened to the car body so as to withstand an individually applied acceleration of 4g acting in the lateral direction and 4g acting in the upward vertical direction on the deadweight of the seat or seats, if held in tandem; and

(2) Have an attachment to the car body of an ultimate strength capable of resisting simultaneously:

(i) The longitudinal inertial force of 8g acting on the mass of the seat; and

(ii) The load associated with the impact into the seatback of an unrestrained 95th-percentile adult male initially seated behind the seat, when the floor to which the seat is attached decelerates with a triangular crash pulse having a peak of 8g and a duration of 250 milliseconds.

(b) Overhead storage racks in a passenger car shall provide longitudinal and lateral restraint for stowed articles. Overhead storage racks shall be attached to the car body with sufficient strength to resist loads due to the following individually applied accelerations acting on the mass of the luggage stowed as determined by the railroad:

(1) Longitudinal: 8g;

(2) Vertical: 4g; and

(3) Lateral: 4g.

(c) Other interior fittings within a passenger car shall be attached to the car body with sufficient strength to withstand the following individually applied accelerations acting on the mass of the fitting:

(1) Longitudinal: 8g;

(2) Vertical: 4g; and

(3) Lateral: 4g.

(d) To the extent possible, all interior fittings in a passenger car, except seats, shall be recessed or flush-mounted.

(e) Sharp edges and corners in a locomotive cab and a passenger car shall be either avoided or padded to mitigate the consequences of an impact with such surfaces.

(f) Each seat provided for a crewmember regularly assigned to occupy the cab of a locomotive and each floor-mounted seat in the cab shall be secured to the car body with an attachment having an ultimate strength capable of withstanding the loads due to the following individually applied accelerations acting on the combined mass of the seat and a 95th-percentile adult male occupying it:

(1) Longitudinal: 8g;
(2) Lateral: 4g; and
(3) Vertical: 4g.

(g) If, for purposes of showing compliance with the requirements of this section, the strength of a seat attachment is to be demonstrated through sled testing, the seat structure and seat attachment to the sled that is used in such testing must be representative of the actual seat structure in, and seat attachment to, the rail vehicle subject to the requirements of this section. If the attachment strength of any other interior fitting is to be demonstrated through sled testing, for purposes of showing compliance with the requirements of this section, such testing shall be conducted in a similar manner.

§ 238.235 Doors.

(a) By December 31, 1999, each powered, exterior side door in a vestibule that is partitioned from the passenger compartment of a passenger car shall have a manual override device that is:

(1) Capable of releasing the door to permit it to be opened without power from inside the car;

(2) Located adjacent to the door which it controls; and

(3) Designed and maintained so that a person may readily access and operate the override device from inside the car without requiring the use of a tool or other implement.

(b) Each passenger car ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002 shall have a minimum of two exterior side doors, each door providing a minimum clear opening with dimensions of 30 inches horizontally by 74 inches vertically.

Note: The Americans with Disabilities Act (ADA) Accessibility Specifications for Transportation Vehicles also contain requirements for doorway clearance (See 49 CFR part 38).

Each powered, exterior side door on each such passenger car shall have a manual override device that is:

(1) Capable of releasing the door to permit it to be opened without power from both inside and outside the car;

(2) Located adjacent to the door which it controls; and

(3) Designed and maintained so that a person may access the override device from both inside and outside the car without requiring the use of a tool or other implement.

(c) A railroad may protect a manual override device used to open a powered, exterior door with a cover or a screen capable of removal without requiring the use of a tool or other implement.

(d) *Marking and instructions.* [Reserved]

§ 238.237 Automated monitoring.

(a) Except as further specified in this paragraph, on or after November 8, 1999 a working alerter or deadman control shall be provided in the controlling locomotive of each passenger train operating in other than cab signal, automatic train control, or automatic train stop territory. If the controlling locomotive is ordered on or after September 8, 2000, or placed into service for the first time on or after September 9, 2002, a working alerter shall be provided.

(b) Alerter or deadman control timing shall be set by the operating railroad taking into consideration maximum train speed and capabilities of the signal system. The railroad shall document the basis for setting alerter or deadman control timing and make this documentation available to FRA upon request.

(c) If the train operator does not respond to the alerter or maintain proper contact with the deadman control, it shall initiate a penalty brake application.

(d) The following procedures apply if the alerter or deadman control fails en route:

(1)(i) A second person qualified on the signal system and brake application procedures shall be stationed in the locomotive cab; or

(ii) The engineer shall be in constant communication with a second crewmember until the train reaches the next terminal.

(2)(i) A tag shall be prominently displayed in the locomotive cab to indicate that the alerter or deadman control is defective, until such device is repaired; and

(ii) When the train reaches its next terminal or the locomotive undergoes its next calender day inspection, whichever occurs first, the alerter or deadman control shall be repaired or the locomotive shall be removed as the controlling locomotive in the train.

Subpart D—Inspection, Testing, and Maintenance Requirements for Tier I Passenger Equipment

§ 238.301 Scope.

(a) This subpart contains requirements pertaining to the inspection, testing, and maintenance of passenger equipment operating at speeds not exceeding 125 miles per hour. The requirements in this subpart address the inspection, testing, and maintenance of the brake system as well as other mechanical and electrical components covered by this part.

(b) Beginning July 12, 2001 the requirements contained in this subpart shall apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of the requirements contained in this subpart upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c).

(c) Paragraphs (b) and (c) of § 238.309 shall apply beginning September 9, 1999.

§ 238.303 Exterior calendar day mechanical inspection of passenger equipment.

(a) *General.*

(1) Except as provided in paragraph (f) of this section, each passenger car and each unpowered vehicle used in a passenger train shall receive an exterior mechanical inspection at least once each calendar day that the equipment is placed in service.

(2) Except as provided in paragraph (f) of this section, all passenger equipment shall be inspected as required in this section at least once each calendar day that the equipment is placed in service to ensure that the equipment conforms with the requirement contained in paragraph (e)(15) of this section.

(3) If a passenger care is also classified as a locomotive under part 229 of this chapter, the passenger car shall also receive a daily inspection pursuant to the requirements of § 229.21 of this chapter.

(b) Each passenger car and each unpowered vehicle added to a passenger train shall receive an exterior calendar day mechanical inspection at the time it is added to the train unless documentation is provided to the train crew that an exterior mechanical inspection was performed on the car the previous calendar day.

(c) The exterior calendar day mechanical inspection shall be performed by a qualified maintenance person.

(d) The exterior calendar day mechanical inspection required by this section shall be conducted to the extent possible without uncoupling the trainset and without placing the equipment over a pit or on an elevated track.

(e) As part of the exterior calendar day mechanical inspection, the railroad shall verify conformity with the following conditions, and nonconformity with any such condition renders the passenger car or unpowered vehicle used in a passenger train defective whenever discovered in service:

(1) Products of combustion are released entirely outside the cab and other compartments.

(2) Each battery container is vented and each battery is kept from gassing excessively.

(3) Each coupler is in the following condition:

(i) Sidewall or pin bearing bosses and the pulling face of the knuckles are not broken or cracked;

(ii) The coupler assembly is equipped with anti-creep protection;

(iii) The coupler carrier is not broken or cracked; and

(iv) The yoke is not broken or cracked.

(4) A device is provided under the lower end of all drawbar pins and articulated connection pins to prevent the pin from falling out of place in case of breakage.

(5) The suspension system, including the spring rigging, is in the following condition:

(i) Protective construction or safety hangers are provided to prevent spring planks, spring seats, or bolsters from dropping to the track structure in event of a hanger or spring failure;

(ii) The top (long) leaf or any of the other three leaves of the elliptical spring is not broken, except when a spring is part of a nest of three or more springs and none of the other springs in the nest has its top leaf or any of the other three leaves broken;

(iii) The outer coil spring or saddle is not broken;

(iv) The equalizers, hangers, bolts, gibs, or pins are not cracked or broken;

(v) The coil spring is not fully compressed when the car is at rest;

(vi) The shock absorber is not broken or leaking oil or other fluid; and

(vii) Each air bag or other pneumatic suspension system component inflates or deflates, as applicable, correctly and otherwise operates as intended.

(6) Each truck is in the following condition:

(i) Each tie bar is not loose;

(ii) Each motor suspension lug, equalizer, hanger, gib, or pin is not cracked or broken; and

(iii) The truck frame is not broken and is not cracked in a stress area that may affect its structural integrity.

(7) Each side bearing is in the following condition:

(i) Each friction side bearing with springs designed to carry weight does not have more than 25 percent of the springs in any one nest broken;

(ii) Each friction side bearing does not run in contact unless designed to carry weight; and

(iii) The maximum clearance of each side bearing does not exceed the manufacturer's recommendation.

(8) Each wheel does not have any of the following conditions:

(i) A single flat spot that is 2½ inches or more in length, or two adjoining spots that are each two or more inches in length;

(ii) A gouge or chip in the flange that is more than 1½ inches in length and ½ inch in width;

(iii) A broken rim, if the tread, measured from the flange at a point 5/8 of an inch above the tread, is less than 3¾ inches in width;

(iv) A shelled-out spot 2½ inches or more in length, or two adjoining spots that are each two or more inches in length;

(v) A seam running lengthwise that is within 3¾ inches of the flange;

(vi) A flange worn to a 7/8 inch thickness or less, gauged at a point 3/8 of an inch above the tread;

(vii) A tread worn hollow 5/16 of an inch or more;

(viii) A flange height of 1½ inches or more measured from the tread to the top of the flange;

(ix) A rim less than 1 inch thick;

(x) A crack or break in the flange, tread, rim, plate, or hub;

(xi) A loose wheel; or

(xii) A weld.

(9) No part or appliance of a passenger coach, except the wheels, is less than 2½ inches above the top of the rail.

(10) Each unguarded, noncurrent-carrying metal part subject to becoming charged is grounded or thoroughly insulated.

(11) Each jumper and cable connection is in the following condition:

(i) Each jumpers and cable connection between coaches, between locomotives, or between a locomotive and a coach is located and guarded in a manner that provides sufficient vertical clearance. Jumpers and cable connections may not hang with one end free;

(ii) The insulation is not broken or badly chafed;

(iii) No plug, receptacle, or terminal is broken; and

(iv) No strand of wire is broken or protruding.

(12) Each door and cover plate guarding high voltage equipment is marked ''Danger—High Voltage'' or with the word ''Danger'' and the normal voltage carried by the parts so protected.

(13) Each buffer plate is in place.

(14) Each diaphragm, if any, is in place and properly aligned.

(15) Each secondary braking system is in operating mode and does not have any known defective condition which prevents its proper operation. If the dynamic brakes on a locomotive are found not to be in operating mode or are known to have a defective condition which prevents their proper operation at the time that the exterior mechanical inspection is performed or at any other time while the locomotive is in service, the following requirements shall be met in order to continue the locomotive in service:

(i) MU locomotives equipped with dynamic brakes found not to be in operating mode or containing a defective condition which prevents the proper operation of the dynamic brakes shall be handled in the same manner as a running gear defect pursuant to § 238.17.

(ii) Conventional locomotives equipped with dynamic brakes found not to be in operating mode or containing a defective condition which prevents the proper operation of the dynamic brakes shall be handled in accordance with the following:

(A) A tag bearing the words ''inoperative dynamic brakes'' shall be securely displayed in a conspicuous location in the cab of the locomotive and contain the locomotive number, the date and location where the condition was discovered, and the signature of the person discovering the condition;

(B) The locomotive engineer shall be informed in writing that the dynamic brakes on the locomotive are inoperative at the location where the locomotive engineer first takes charge of the train; and

(C) The inoperative or defective dynamic brakes shall be repaired within 3 calendar days of being found in defective condition or at the locomotive's next periodic inspection pursuant to § 229.23 of this chapter, whichever occurs first.

(f) *Exception.* A long-distance intercity passenger train that misses a scheduled exterior calendar day mechanical inspection due to a delay en route may continue in service to the location where the inspection was scheduled to be performed. At that point, an exterior calendar day mechanical inspection shall be performed prior to returning the equipment to service. This flexibility applies only to the exterior mechanical safety inspections required by this section, and does not relieve the railroad of the responsibility to perform a calendar day inspection on a unit classified as a ''locomotive'' under part 229 of this chapter as required by § 229.21 of this chapter.

(g) *Records.* A record shall be maintained of each exterior calendar day mechanical inspection performed.

(1) This record may be maintained in writing or electronically provided FRA has access to the record upon request.

(2) The written or electronic record must contain the following information:

(i) The identification number of the unit;

(ii) The place, date, and time of the inspection;

(iii) Any non-complying conditions found; and

(iv) The signature of the inspector.

(3) This record may be part of a single master report covering an entire group of cars and equipment.

(4) This record shall be maintained at the place where the inspection is conducted or at one central location and shall be retained for at least 92 days.

(h) Cars requiring a single car test in accordance with § 238.311 that are being moved in service to a location where the single car test can be performed shall have the single car test completed prior to, or as a part of, the exterior calendar day mechanical inspection.

§ 238.305 Interior calendar day mechanical inspection of passenger cars.

(a) Except as provided in paragraph (d) of this section, each passenger car shall receive an interior mechanical inspection at least once each calendar day that it is placed in service.

(b) The interior calendar day mechanical inspection shall be performed by a qualified person or a qualified maintenance person.

(c) As part of the interior calendar day mechanical inspection, the railroad shall verify conformity with the following conditions, and nonconformity with any such condition renders the car defective whenever discovered in service, except as provided in paragraph (c)(5) of this section:

(1) All fan openings, exposed gears and pinions, exposed moving parts of mechanisms, pipes carrying hot gases and high-voltage equipment, switches, circuit breakers, contactors, relays, grid resistors, and fuses are installed in non-hazardous locations or equipped with guards to prevent personal injury.

(2) The words ''Emergency Brake Valve'' are legibly stenciled or marked near each brake pipe valve or shown on an adjacent badge plate.

(3) All doors and cover plates guarding high voltage equipment are marked ''Danger—High Voltage'' or with the word ''Danger'' and the normal voltage carried by the parts so protected.

(4) All trap doors safely operate and securely latch in place in both the up and down position.

(5) All end doors and side doors operate safely and as intended. If a door is defective and all of the following conditions are satisfied, the car may remain in passenger service until the next interior calendar day mechanical inspection is due at which time the appropriate repairs shall be made:

(i) A qualified person or a qualified maintenance person determines that the repairs necessary to bring a door into compliance cannot be performed at the time the interior mechanical inspection is conducted;

(ii) A qualified person or a qualified maintenance person determines that it is safe to move the equipment in passenger service;

(iii) At least one operative and accessible door is available on each side of the car; and

(iv) A notice is prominently displayed directly on the defective door indicating that the door is defective.

(6) All safety-related signage is in place and legible.

(7) All vestibule steps are illuminated.

(8) All D rings, pull handles, or other means to access manual door releases are in place based on a visual inspection.

(9) All emergency equipment, including a fire extinguisher, pry bar, auxiliary portable lighting, and first aid kits, as applicable, are in place.

(d) A long-distance intercity passenger train that misses a scheduled calendar day interior mechanical inspection due to a delay en route may continue in service to the location where the inspection was scheduled to be performed. At that point, an interior calendar day mechanical inspection shall be performed prior to returning the equipment to service.

(e) *Records.* A record shall be maintained of each interior calendar day mechanical inspection performed.

(1) This record may be maintained in writing or electronically provided FRA has access to the record upon request.

(2) The written or electronic record must contain the following information:

(i) The identification number of the unit;

(ii) The place, date, and time of the inspection;

(iii) Any non-complying conditions found; and

(iv) The signature of the inspector.

(3) This record may be part of a single master report covering an entire group of cars and equipment.

(4) This record shall be maintained at the place where the inspection is conducted or at one central location and shall be retained for at least 92 days.

§ 238.307 Periodic mechanical inspection of passenger cars and unpowered vehicles used in passenger trains.

(a) *General.*

(1) Railroads shall conduct periodic mechanical inspections of all passenger cars and all unpowered vehicles used in a passenger train as required by this section or as warranted and justified by data developed pursuant to paragraph (a)(2) of this section. A periodic inspection conducted under part 229 of this chapter satisfies the requirement of this section with respect to the features inspected.

(2) A railroad may, upon written notification to FRA's Associate Administrator for Safety, adopt and comply with alternative periodic mechanical inspection intervals for specific components or equipment in lieu of the requirements of this section. Any alternative interval must be based upon a documented reliability assessment conducted under a system safety plan subject to periodic peer audit. (See Appendix E to this part for a discussion of the general principles of reliability-based maintenance programs.) The periodic inspection intervals provided in this section may be changed only when justified by accumulated, verifiable data that provides a high level of confidence that the component(s) will not fail in a manner resulting in harm to persons. FRA may monitor and review a railroad's implementation and compliance with any alternative interval adopted. FRA's Associate Administrator for Safety may prohibit or revoke a railroad's ability to utilize an alternative inspection interval if FRA determines that the adopted interval is not supported by credible data or does not provide adequate safety assurances. Such a determination will be made in writing and will state the basis for such action.

(b) Each periodic mechanical inspection required by this section shall be performed by a qualified maintenance person.

(c) As part of the periodic mechanical inspection the railroad shall verify the condition of the following interior and exterior mechanical components, which shall be inspected not less frequently than every 92 days. At a minimum, this inspection shall determine that:

(1) Floors of passageways and compartments are free from oil, water, waste, or any obstruction that creates a slipping, tripping, or fire hazard, and floors are properly treated to provide secure footing.

(2) Emergency lighting systems are operational.

(3) With regard to switches:

(i) All hand-operated switches carrying currents with a potential of more than 150 volts that may be operated while under load are covered and are operative from the outside of the cover;

(ii) A means is provided to display whether the switches are open or closed; and

(iii) Switches not designed to be operated safely while under load are legibly marked with the voltage carried and the words ''must not be operated under load''.

(4) All trucks are equipped with a device or securing arrangement to prevent the truck and car body from separating in case of derailment.

(5) All center castings on trucks are not cracked or broken.

(6) All roller bearings do not have any of the following conditions:

(i) A sign of having been overheated as evidenced by discoloration or other telltale sign of overheating such as damage to the seal or distortion of any bearing component;

(ii) A loose or missing cap screw;

(iii) A broken, missing, or improperly applied cap screw lock; or

(iv) A seal that is loose or damaged or permits leakage of lubricant in clearly formed droplets.

(7) All mechanical systems and components of the equipment are free of all the following general conditions that endanger the safety of the crew, passengers, or equipment:

(i) A continuous accumulation of oil or grease;

(ii) Improper functioning of a component;

(iii) A crack, break, excessive wear, structural defect, or weakness of a component;

(iv) A leak;

(v) Use of a component or system under a condition that exceeds that for which the component or system is designed to operate; and

(vi) Insecure attachment of a component.

(8) All of the items identified in the exterior calendar day mechanical inspection contained at § 238.303 are in conformity with the conditions prescribed in that section.

(9) All of the items identified in the interior calendar day mechanical inspection contained at § 238.305 are in conformity with the conditions prescribed in that section.

(d) The periodic mechanical inspection shall specifically include the following interior and exterior mechanical components, which shall be inspected not less frequently than every 184 days. At a minimum, this inspection shall determine that:

(1) Seats and seat attachments are not broken or loose.

(2) Luggage racks are not broken or loose.

(3) All beds and bunks are not broken or loose, and all restraints or safety latches and straps are in place and function as intended.

(4) A representative sample of emergency window exits on the railroad's passenger cars properly operate, in accordance with the requirements of § 239.107 of this chapter.

(5) Each coupler is in the following condition:

(i) The distance between the guard arm and the knuckle nose is not more than 5½ inches on standard type couplers (MCB contour 1904), or not more than 5$^{5}/_{16}$ inches on D&E couplers;

(ii) The free slack in the coupler or drawbar not absorbed by friction devices or draft gears is not more than ½ inch; and

(iii) The draft gear is not broken.

(e) The periodic mechanical inspection shall specifically include the manual door releases, which shall be inspected not less frequently than every 368 days. At a minimum, this inspection shall determine that all manual door releases operate as intended.

(f) *Records.* (1) A record shall be maintained of each periodic mechanical inspection required to be performed by this section. This record may be maintained in writing or electronically provided FRA has access to the record upon request. The date and place of the periodic inspection shall be recorded and the person performing the inspection and that person's supervisor shall sign the form, if possible. This record shall be kept in the railroad's files, the cab of the locomotive, or a designated location in the passenger car until the next periodic mechanical inspection of the same type is performed.

(2) Detailed documentation of any reliability assessments depended upon for implementing an alternative inspection interval under paragraph (a)(2) of this section, including underlying data, shall be retained during the period that the alternative inspection interval is in effect. Data documenting inspections, tests, component replacement and renewals, and failures shall be retained for not less than three (3) inspection intervals.

(g) Nonconformity with any of the conditions set forth in this section renders the car or vehicle defective whenever discovered in service.

§ 238.309 Periodic brake equipment maintenance.

(a) *General.*

(1) This section contains the minimum intervals at which the brake equipment on various types of passenger equipment shall be periodically cleaned, repaired, and tested. This maintenance procedure requires that all of the equipment's brake system pneumatic components that contain moving parts and are sealed against air leaks be removed from the equipment, disassembled, cleaned, and lubricated and that the parts that can deteriorate with age be replaced.

(2) A railroad may petition FRA's Associate Administrator for Safety to approve alternative maintenance procedures providing equivalent safety, in lieu of the requirements of this section. The petition shall be filed as provided in § 238.21.

(b) *MU locomotives.* The brake equipment of each MU locomotive shall be cleaned, repaired, and tested at intervals in accordance with the following schedule:

(1) Every 736 days if the MU locomotive is part of a fleet that is not 100 percent equipped with air dryers;

(2) Every 1,104 days if the MU locomotive is part of a fleet that is 100 percent equipped with air dryers and is equipped with PS–68, 26–C, 26–L, PS–90, CS–1, RT–2, RT–5A, GRB–1, CS–2, or 26–R brake systems. (This listing of brake system types is intended to subsume all brake systems using 26 type, ABD, or ABDW control valves and PS68, PS–90, 26B–1, 26C, 26CE, 26–B1, 30CDW, or 30ECDW engineer's brake valves.); and

(3) Every 736 days for all other MU locomotives.

(c) *Conventional locomotives.* The brake equipment of each conventional locomotive shall be cleaned, repaired, and tested at intervals in accordance with the following schedule:

(1) Every 1,104 days for a locomotive equipped with a 26–L or equivalent brake system; and

(2) Every 736 days for a locomotive equipped with other than a 26–L or equivalent brake system.

(d) *Passenger coaches and other unpowered vehicles.* The brake equipment on each passenger coach and each unpowered vehicle used in a passenger train shall be cleaned, repaired, and tested at intervals in accordance with following schedule:

(1) Every 1,476 days for a coach or vehicle equipped with a 26–C or equivalent brake system; and

(2) Every 1,104 days for a coach or vehicle equipped with other than a 26–C or equivalent brake system.

(e) *Cab cars.* The brake equipment of each cab car shall be cleaned, repaired, and tested at intervals in accordance with the following schedule:

(1) Every 1,476 days for that portion of the cab car brake system using brake

valves that are identical to the passenger coach 26–C brake system;

(2) Every 1,104 days for that portion of the cab car brake system using brake valves that are identical to the locomotive 26–L brake system; and

(3) Every 736 days for all other types of cab car brake valves.

(f) *Records of periodic maintenance.*

(1) The date and place of the cleaning, repairing, and testing required by this section shall be recorded on Form FRA 6180–49A or a similar form developed by the railroad containing the same information, and the person performing the work and that person's supervisor shall sign the form, if possible. Alternatively, the railroad may stencil the vehicle with the date and place of the cleaning, repairing, and testing and maintain an electronic record of the person performing the work and that person's supervisor.

(2) A record of the parts of the air brake system that are cleaned, repaired, and tested shall be kept in the railroad's files, the cab of the locomotive, or a designated location in the passenger car until the next such periodic test is performed.

§ 238.311 Single car test.

(a) Except for self-propelled passenger cars, single car tests of all passenger cars and all unpowered vehicles used in passenger trains shall be performed in accordance with either APTA Standard SS–M–005–98, ''Code of Tests for Passenger Car Equipment Using Single Car Testing Device,'' published March, 1998; or an alternative procedure approved by FRA pursuant to § 238.21. The incorporation by reference of this APTA standard was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated document from the American Public Transit Association, 1201 New York Avenue, N.W., Washington, D.C. 20005. You may inspect a copy of the document at the Federal Railroad Administration, Docket Clerk, 1120 Vermont Avenue, N.W., Suite 7000, Washington, D.C. or at the Office of the Federal Register, 800 North Capitol Street, N.W., Suite 700, Washington, D.C.

(b) Each single car test required by this section shall be performed by a qualified maintenance person.

(c) A railroad shall perform a single car test of the brake system of a car or vehicle described in paragraph (a) of this section if the car or vehicle is found with one or more of the following wheel defects:

(1) Built-up tread;

(2) Slid flat wheel;

(3) Thermal crack;

(4) Overheated wheel; or

(5) Shelling.

(d) A railroad need not perform the single car test required in paragraph (c) of this section, if the railroad can establish that the wheel defect is other than built-up tread and is due to a cause other than a defective brake system on the car.

(e) Except as provided in paragraph (f) of this section, a railroad shall perform a single car test of the brake system of a car or vehicle described in paragraph (a) of this section when:

(1) The car or vehicle is placed in service after having been out of service for 30 days or more; or

(2) One or more of the following conventional air brake equipment items is removed, repaired, or replaced:

(i) Relay valve;

(ii) Service portion;

(iii) Emergency portion; or

(iv) Pipe bracket.

(f) *Exception.* If the single car test cannot be made at the point where repairs are made, the car may be moved in passenger service to the next forward location where the test can be made. A railroad may move a car in this fashion only after visually verifying an application and release of the brakes on both sides of the car that was repaired, and provided that the car is appropriately tagged to indicate the need to perform a single car test. The single car test shall be completed prior to, or as a part of, the car's next calendar day mechanical inspection.

(g) If one or more of the following conventional air brake equipment items is removed, repaired, or replaced only that portion which is renewed or replaced must be tested to satisfy the provisions of this section:

(1) Brake reservoir;

(2) Brake cylinder;

(3) Piston assembly;

(4) Vent valve;

(5) Quick service valve;

(6) Brake cylinder release valve;

(7) Modulating valve or slack adjuster; or

(8) Angle cock or cutout cock.

§ 238.313 Class I brake test.

(a) Each commuter and short-distance intercity passenger train shall receive a Class I brake test once each calendar day that the train is placed or continues in passenger service.

(b) Except as provided in paragraph (i) of this section, each long-distance intercity passenger train shall receive a Class I brake test:

(1) Prior to the train's departure from an originating terminal; and

(2) Every 1,500 miles or once each additional calendar day, whichever occurs first, that the train remains in continuous passenger service.

(c) Each car added to a passenger train shall receive a Class I brake test at the time it is added to the train unless documentation is provided to the train crew that a Class I brake test was performed on the car within the previous calendar day and the car has not been disconnected from a source of compressed air for more than four hours prior to being added to the train.

(d) Each Class I brake test shall be performed by a qualified maintenance person.

(e) Each Class I brake test may be performed either separately or in conjunction with the exterior calendar day mechanical inspection required under § 238.303.

(f) Except as provided in § 238.15(b), a railroad shall not use or haul a passenger train in passenger service from a location where a Class I brake test has been performed, or was required by this part to have been performed, with less than 100 percent operative brakes.

(g) A Class I brake test shall determine and ensure that:

(1) The friction brakes apply and remain applied on each car in the train until a release of the brakes has been initiated on each car in response to train line electric, pneumatic, or other signals. This test shall include a verification that each side of each car's brake system responds properly to application and release signals;

(2) The brake shoes or pads are firmly seated against the wheel or disc with the brakes applied;

(3) Piston travel is within prescribed limits, either by direct observation, observation of an actuator, or by observation of the clearance between the brake shoe and the wheel or between the brake pad and the brake disc with the brakes released;

(4) The communicating signal system is tested and known to be operating as intended;

(5) Each brake shoe or pad is securely fastened and correctly aligned in relation to the wheel or to the disc;

(6) The engineer's brake valve or controller will cause the proper train line commands for each position or brake level setting;

(7) Brake pipe leakage does not exceed 5 pounds per square inch per minute if leakage will affect service performance;

(8) The emergency brake application and deadman pedal or other emergency control devices function as intended;

(9) Each brake shoe or pad is not below the minimum thickness established by the railroad. This

thickness shall not be less than the minimum thickness necessary to safely travel the maximum distance allowed between Class I brake tests;

(10) Each angle cock and cutout cock is properly positioned;

(11) The brake rigging or the system mounted on the car for the transmission of the braking force does not bind or foul so as to impede the force delivered to a brake shoe, impede the release of a brake shoe, or otherwise adversely affect the operation of the brake system;

(12) If the train is equipped with electropneumatic brakes, an electropneumatic application of the brakes is made and the train is walked to determine that the brakes on each car in the train properly apply;

(13) Each brake disc is free of any crack in accordance with the manufacturer's specifications or, if no specifications exist, free of any crack to the extent that the design permits;

(14) If the equipment is provided with a brake indicator, the brake indicator operates as intended; and

(15) The communication of brake pipe pressure changes at the rear of the train is verified.

(h) A qualified maintenance person that performs a Class I brake test on a train shall place in the cab of the controlling locomotive of the train a written statement, which shall be retained in the cab until the next Class I brake test is performed and which shall contain the following information:

(1) The date and time the Class I brake test was performed;

(2) The location where the test was performed;

(3) The identification number of the controlling locomotive of the train; and

(4) The total number of cars inspected during the Class I brake test.

(i) A long-distance, intercity passenger train that misses a scheduled calendar day Class I brake test due to a delay en route may proceed to the point where the Class I brake test was scheduled to be performed. A Class I brake test shall be completed at that point prior to placing the train back in service.

§ 238.315 Class IA brake test.

(a) Except as provided in paragraph (b) of this section, either a Class I or a Class IA brake test shall be performed:

(1) Prior to the first morning departure of each commuter or short-distance intercity passenger train, unless all of the following conditions are satisfied:

(i) A Class I brake test was performed within the previous twelve (12) hours;

(ii) The train has not been used in passenger service since the performance of the Class I brake test; and

(iii) The train has not been disconnected from a source of compressed air for more than four hours since the performance of the Class I brake test; and

(2) Prior to placing a train in service that has been off a source of compressed air for more than four hours.

(b) A commuter or short-distance intercity passenger train that provides continuing late night service that began prior to midnight may complete its daily operating cycle after midnight without performing another Class I or Class IA brake test. A Class I or Class IA brake test shall be performed on such a train before it starts a new daily operating cycle.

(c) A Class I or Class IA brake test may be performed at a shop or yard site and need not be repeated at the first passenger terminal if the train remains on a source of compressed air and in the custody of the train crew.

(d) The Class IA brake test shall be performed by either a qualified person or a qualified maintenance person.

(e) Except as provided in § 238.15(b), a railroad shall not use or haul a passenger train in passenger service from a location where a Class IA brake test has been performed, or was required by this part to have been performed, with less than 100 percent operative brakes.

(f) In performing a Class IA brake test, it shall be determined that:

(1) Brake pipe leakage does not exceed 5 pounds per square inch per minute if brake pipe leakage will affect service performance;

(2) Each brake sets and releases by inspecting in the manner described in paragraph (g) of this section;

(3) On MU equipment, the emergency brake application and the deadman pedal or other emergency control devices function as intended;

(4) Each angle cock and cutout cock is properly set;

(5) Brake pipe pressure changes at the rear of the train are properly communicated to the controlling locomotive; and

(6) The communicating signal system is tested and known to be operating as intended;

(g) In determining whether each brake sets and releases—

(1) The inspection of the set and release of the brakes shall be completed by walking the train to directly observe the set and release of each brake, if the railroad determines that such a procedure is safe.

(2) If the railroad determines that operating conditions pose a safety hazard to an inspector walking the brakes, brake indicators may be used to verify the set and release on cars so equipped. However, the observation of the brake indicators shall not be made from the cab of the locomotive. The inspector shall walk the train in order to position himself or herself to accurately observe each indicator.

§ 238.317 Class II brake test.

(a) A Class II brake test shall be performed on a passenger train when any of the following events occurs:

(1) Whenever the control stand used to control the train is changed; except if the control stand is changed to facilitate the movement of a passenger train from one track to another within a terminal complex while not in passenger service. In these circumstances, a Class II brake test shall be performed prior to the train's departure from the terminal complex with passengers;

(2) Prior to the first morning departure of each commuter or short-distance intercity passenger train where a Class I brake test remains valid as provided in § 238.315(a)(1);

(3) When previously tested units (i.e., cars that received a Class I brake test within the previous calendar day and have not been disconnected from a source of compressed air for more than four hours) are added to the train;

(4) When cars or equipment are removed from the train; and

(5) When an operator first takes charge of the train, except for face-to-face relief.

(b) A Class II brake test shall be performed by a qualified person or a qualified maintenance person.

(c) Except as provided in § 238.15, a railroad shall not use or haul a passenger train in passenger service from a terminal or yard where a Class II brake test has been performed, or was required by this part to have been performed, with any of the brakes cut-out, inoperative, or defective.

(d) In performing a Class II brake test on a train, a railroad shall determine that:

(1) The brakes on the rear unit of the train apply and release in response to a signal from the engineer's brake valve or controller of the leading or controlling unit, or a gauge located at the rear of the train or in the cab of the rear unit indicates that brake pipe pressure changes are properly communicated at the rear of the train;

(2) On MU equipment, the emergency brake application and deadman pedal or other emergency control devices function as intended; and

(3) The communicating signal system is tested and known to be operating as intended.

§ 238.319 Running brake test.

(a) As soon as conditions safely permit, a running brake test shall be performed on each passenger train after the train has received, or was required under this part to have received, either a Class I, Class IA, or Class II brake test.

(b) A running brake test shall be performed whenever the control stand used to control the train is changed to facilitate the movement of a passenger train from one track to another within a terminal complex while not in passenger service.

(c) The running brake test shall be conducted in accordance with the railroad's established operating rules, and shall be made by applying brakes in a manner that allows the engineer to ascertain whether the brakes are operating properly.

(d) If the engineer determines that the brakes are not operating properly, the engineer shall stop the train and follow the procedures provided in § 238.15.

Subpart E—Specific Requirements for Tier II Passenger Equipment

§ 238.401 Scope.

This subpart contains specific requirements for railroad passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph. The requirements of this subpart apply beginning on September 9, 1999. As stated in § 238.433(b), all such passenger equipment remains subject to the requirements concerning couplers and uncoupling devices contained in Federal statute at 49 U.S.C. chapter 203 and in FRA regulations at part 231 and § 232.2 of this chapter.

§ 238.403 Crash energy management.

(a) Each power car and trailer car shall be designed with a crash energy management system to dissipate kinetic energy during a collision. The crash energy management system shall provide a controlled deformation and collapse of designated sections within the unoccupied volumes to absorb collision energy and to reduce the decelerations on passengers and crewmembers resulting from dynamic forces transmitted to occupied volumes.

(b) The design of each unit shall consist of an occupied volume located between two normally unoccupied volumes. Where practical, sections within the unoccupied volumes shall be designed to be structurally weaker than the occupied volume. During a collision, the designated sections within the unoccupied volumes shall start to deform and eventually collapse in a controlled fashion to dissipate energy before any structural damage occurs to the occupied volume.

(c) At a minimum, each Tier II passenger train shall be designed to meet the following requirements:

(1) Thirteen megajoules (MJ) shall be absorbed at each end of the train through the controlled crushing of unoccupied volumes, and of this amount a minimum of 5 MJ shall be absorbed ahead of the operator's cab in each power car;

(2) A minimum of an additional 3 MJ shall be absorbed by the power car structure between the operator's cab and the first trailer car; and

(3) The end of the first trailer car adjacent to each power car shall absorb a minimum of 5 MJ through controlled crushing.

(d) For a 30-mph collision of a Tier II passenger train on tangent, level track with an identical stationary train:

(1) When seated anywhere in a trailer car, the velocity at which a 50th-percentile adult male contacts the seat back ahead of him shall not exceed 25 mph; and

(2) The deceleration of the occupied volumes of each trailer car shall not exceed 8g. For the purpose of demonstrating compliance with this paragraph, deceleration measurements may be processed through a low-pass filter having a bandwidth of 50 Hz.

(e) Compliance with paragraphs (a) through (d) of this section shall be demonstrated by analysis using a dynamic collision computer model. For the purpose of demonstrating compliance, the following assumptions shall be made:

(1) The train remains upright, in line, and with all wheels on the track throughout the collision; and

(2) Resistance to structural crushing follows the force-versus-displacement relationship determined during the structural analysis required as part of the design of the train.

(f) Passenger seating shall not be permitted in the leading unit of a Tier II passenger train.

§ 238.405 Longitudinal static compressive strength.

(a) To form an effective crash refuge for crewmembers occupying the cab of a power car, the underframe of the cab of a power car shall resist a minimum longitudinal static compressive force of 2,100,000 pounds without permanent deformation to the cab, unless equivalent protection to crewmembers is provided under an alternate design approach, validated through analysis and testing, and approved by FRA under the provisions of § 238.21.

(b) The underframe of the occupied volume of each trailer car shall resist a minimum longitudinal static compressive force of 800,000 pounds without permanent deformation to the car. To demonstrate compliance with this requirement, the 800,000-pound load shall be applied to the underframe of the occupied volume as it would be transmitted to the underframe by the full structure of the vehicle.

(c) Unoccupied volumes of a power car or a trailer car designed to crush as part of the crash energy management design are not subject to the requirements of this section.

§ 238.407 Anti-climbing mechanism.

(a) Each power car shall have an anti-climbing mechanism at its forward end capable of resisting an ultimate upward or downward static vertical force of 200,000 pounds. A power car constructed with a crash energy management design is permitted to crush in a controlled manner before the anti-climbing mechanism fully engages.

(b) Interior train coupling points between units, including between units of articulated cars or other permanently joined units of cars, shall have an anti-climbing mechanism capable of resisting an upward or downward vertical force of 100,000 pounds without yielding.

(c) The forward coupler of a power car shall be attached to the car body to resist a vertical downward force of 100,000 pounds for any horizontal position of the coupler without yielding.

§ 238.409 Forward end structures of power car cabs.

This section contains requirements for the forward end structure of the cab of a power car. (A conceptual implementation of this end structure is provided in Figure 1 to this subpart.)

(a) *Center collision post.* The forward end structure shall have a full-height center collision post, or its structural equivalent, capable of withstanding the following:

(1) A shear load of 500,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint;

(2) A shear load of 150,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint; and

(3) A horizontal, longitudinal force of 300,000 pounds, applied at a point on level with the bottom of the windshield, without exceeding its ultimate strength.

(b) *Side collision posts.* The forward end structure shall have two side collision posts, or their structural equivalent, located at approximately the one-third points laterally, each capable of withstanding the following:

(1) A shear load of 500,000 pounds at its joint with the underframe without

exceeding the ultimate strength of the joint; and

(2) A horizontal, longitudinal force of 300,000 pounds, applied at a point on level with the bottom of the windshield, without exceeding its ultimate strength.

(c) *Corner posts.* The forward end structure shall have two full-height corner posts, or their structural equivalent, each capable of withstanding the following:

(1) A horizontal, longitudinal or lateral shear load of 300,000 pounds at its joint with the underframe, without exceeding the ultimate strength of the joint;

(2) A horizontal, lateral force of 100,000 pounds applied at a point 30 inches up from the underframe attachment, without exceeding the yield or the critical buckling stress; and

(3) A horizontal, longitudinal or lateral shear load of 80,000 pounds at its joint with the roof, without exceeding the ultimate strength of the joint.

(d) *Skin.* The skin covering the forward-facing end of each power car shall be:

(1) Equivalent to a ½-inch steel plate with a 25,000 pounds-per-square-inch yield strength—material of a higher yield strength may be used to decrease the required thickness of the material provided at least an equivalent level of strength is maintained;

(2) Securely attached to the end structure; and

(3) Sealed to prevent the entry of fluids into the occupied cab area of the equipment. As used in paragraph (d), the term ''skin'' does not include forward-facing windows and doors.

§ 238.411 Rear end structures of power car cabs.

The rear end structure of the cab of a power car shall be designed to include the following elements, or their structural equivalent. (A conceptual implementation of this end structure is provided in Figure 2 to this subpart.)

(a) *Corner posts.* The rear end structure shall have two full-height corner posts, or their structural equivalent, each capable of withstanding the following:

(1) A horizontal, longitudinal or lateral shear load of 300,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint; and

(2) A horizontal, longitudinal or lateral shear load of 80,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

(b) *Collision posts.* The rear end structure shall have two full-height collision posts, or their structural equivalent, each capable of withstanding the following:

(1) A horizontal, longitudinal shear load of 750,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint; and

(2) A horizontal, longitudinal shear load of 75,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

§ 238.413 End structures of trailer cars.

(a) Except as provided in paragraph (b) of this section, the end structure of a trailer car shall be designed to include the following elements, or their structural equivalent. (A conceptual implementation of this end structure is provided in Figure 3 to this subpart.)

(1) *Corner posts.* Two full-height corner posts, each capable of withstanding the following:

(i) A horizontal, longitudinal shear load of 150,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint;

(ii) A horizontal, longitudinal or lateral force of 30,000 pounds applied at a point 18 inches up from the underframe attachment without exceeding the yield or the critical buckling stress; and

(iii) A horizontal, longitudinal or lateral shear load of 20,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

(2) *Collision posts.* Two full-height collision posts each capable of withstanding the following:

(i) A horizontal, longitudinal shear load of 300,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint; and

(ii) A horizontal, longitudinal shear load of 60,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

(b) If the trailer car is designed with an end vestibule, the end structure inboard of the vestibule shall have two full-height corner posts, or their structural equivalent, each capable of withstanding the following (A conceptual implementation of this end structure is provided in Figure 4 to this subpart):

(1) A horizontal, longitudinal shear load of 200,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint;

(2) A horizontal, lateral force of 30,000 pounds applied at a point 18 inches up from the underframe attachment without exceeding the yield or the critical buckling stress;

(3) A horizontal, longitudinal force of 50,000 pounds applied at a point 18 inches up from the underframe attachment without exceeding the yield or the critical buckling stress; and

(4) A horizontal, longitudinal or lateral shear load of 20,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

§ 238.415 Rollover strength.

(a) Each passenger car and power car shall be designed to rest on its side and be uniformly supported at the top (''roof rail'') and the bottom chords (''side sill'') of the side frame. The allowable stress in the structural members of the occupied volumes for this condition shall be one-half yield or one-half the critical buckling stress, whichever is less. Minor localized deformations to the outer side skin of the passenger car or power car is allowed provided such deformations in no way intrude upon the occupied volume of each car.

(b) Each passenger car and power car shall also be designed to rest on its roof so that any damage in occupied areas is limited to roof sheathing and framing. The allowable stress in the structural members of the occupied volumes for this condition shall be one-half yield or one-half the critical buckling stress, whichever is less. Deformation to the roof sheathing and framing is allowed to the extent necessary to permit the vehicle to be supported directly on the top chords of the side frames and end frames.

§ 238.417 Side loads.

(a) Each passenger car body structure shall be designed to resist an inward transverse load of 80,000 pounds of force applied to the side sill and 10,000 pounds of force applied to the belt rail (horizontal members at the bottom of the window opening in the side frame).

(b) These loads shall be considered to be applied separately over the full vertical dimension of the specified member for any distance of 8 feet in the direction of the length of the car.

(c) The allowable stress shall be the lesser of the yield stress, except as otherwise allowed by this paragraph, or the critical buckling stress. In calculating the stress to show compliance with this requirement, local yielding of the side skin adjacent to the side sill and belt rail, and local yielding of the side sill bend radii at the crossbearer and floor-beam connections is allowed. For purposes of this paragraph, local yielding is allowed provided the resulting deformations in no way intrude upon the occupied volume of the car.

(d) The connections of the side frame to the roof and underframe shall support the loads specified in this section.

§ 238.419 Truck-to-car-body and truck component attachment.

(a) The ultimate strength of the truck-to-car-body attachment for each unit in

a train shall be sufficient to resist without failure a vertical force equivalent to 2g acting on the mass of the truck and a force of 250,000 pounds acting in any horizontal direction on the truck.

(b) Each component of a truck (which include axles, wheels, bearings, the truck-mounted brake system, suspension system components, and any other components attached to the truck by design) shall remain attached to the truck when a force equivalent to 2g acting on the mass of the component is exerted in any direction on that component.

§ 238.421 Glazing.

(a) *General.* Except as provided in paragraphs (b) and (c) of this section, each exterior window on a passenger car and a power car cab shall comply with the requirements contained in part 223 of this chapter.

(b) *Particular end-facing exterior glazing requirements.* Each end-facing exterior window on a passenger car and a power car cab shall also:

(1) Resist the impact of a 12-pound solid steel sphere at the maximum speed at which the vehicle will operate, at an angle of 90 degrees to the window's surface, with no penetration or spall; and

(2) Demonstrate anti-spalling performance by the use of a 0.001 aluminum witness plate, placed 12 inches from the window's surface during all impact tests. The witness plate shall contain no marks from spalled glazing particles after any impact test.

(3) Be permanently marked, prior to installation, in such a manner that the marking is clearly visible after the material has been installed. The marking shall include:

(i) The words ''FRA TYPE IHP'' to indicate that the material has successfully passed the testing requirements specified in this paragraph;

(ii) The name of the manufacturer; and

(iii) The type or brand identification of the material.

(c) *Passenger equipment ordered prior to May 12, 1999.* Each exterior window in passenger equipment ordered prior to May 12, 1999 may comply with the following glazing requirements in the alternative of the requirements specified in paragraphs (a) and (b) of this section, until the window is replaced and the railroad has exhausted its inventory of replacement windows conforming to the requirements of this paragraph that it held as of May 12, 1999.

(1) Each end-facing exterior window shall resist the impact of a 12-pound solid steel sphere at the maximum speed at which the vehicle will operate, at an angle equal to the angle between the window's surface as installed and the direction of travel, with no penetration or spall.

(2) Each side-facing exterior window shall resist the impact of a:

(i) 12-pound solid steel sphere at 15 mph, at an angle of 90 degrees to the window's surface, with no penetration or spall; and

(ii) A granite ballast stone weighing a minimum of 0.5 pounds, traveling at 75 mph and impacting at a 90-degree angle to the window's surface, with no penetration or spall.

(3) All exterior windows shall:

(i) Resist a single impact of a 9-mm, 147-grain bullet traveling at an impact velocity of 900 feet per second, with no bullet penetration or spall; and

(ii) Demonstrate anti-spalling performance by the use of a 0.001 aluminum witness plate, placed 12 inches from the window's surface during all impact tests. The witness plate shall contain no marks from spalled glazing particles after any impact test.

(iii) Be permanently marked, prior to installation, in such a manner that the marking is clearly visible after the material has been installed. The marking shall include:

(A) The words ''FRA TYPE IH'' for end-facing glazing or ''FRA TYPE IIH'' for side-facing glazing, to indicate that the material has successfully passed the testing requirements of this section;

(B) The name of the manufacturer; and

(C) The type or brand identification of the material.

(d) *Glazing securement.* Each exterior window on a passenger car and a power car cab shall remain in place when subjected to:

(1) The forces due to air pressure differences caused when two trains pass at the minimum separation for two adjacent tracks, while traveling in opposite directions, each train traveling at the maximum authorized speed; and

(2) The impact forces that the glazed window is required to resist as specified in this section.

(e) *Stenciling.* Each car that is fully equipped with glazing materials that meet the requirements of this section shall be stenciled on an interior wall as follows: ''Fully Equipped with FRA Part 238 Glazing'' or similar words conveying that meaning, in letters at least ⅜ of an inch high.

§ 238.423 Fuel tanks.

(a) *External fuel tanks.* Each type of external fuel tank must be approved by FRA's Associate Administrator for Safety upon a showing that the fuel tank provides a level of safety at least equivalent to a fuel tank that complies with the external fuel tank requirements in § 238.223(a).

(b) *Internal fuel tanks.* Internal fuel tanks shall comply with the requirements specified in § 238.223(b).

§ 238.425 Electrical system.

(a) *Circuit protection.*

(1) The main propulsion power line shall be protected with a lightning arrestor, automatic circuit breaker, and overload relay. The lightning arrestor shall be run by the most direct path possible to ground with a connection to ground of not less than No. 6 AWG. These overload protection devices shall be housed in an enclosure designed specifically for that purpose with the arc chute vented directly to outside air.

(2) Head end power, including trainline power distribution, shall be provided with both overload and ground fault protection.

(3) Circuits used for purposes other than propelling the equipment shall be connected to their power source through circuit breakers or equivalent current-limiting devices.

(4) Each auxiliary circuit shall be provided with a circuit breaker located as near as practical to the point of connection to the source of power for that circuit; however, such protection may be omitted from circuits controlling safety-critical devices.

(b) *Main battery system.*

(1) The main batteries shall be isolated from the cab and passenger seating areas by a non-combustible barrier.

(2) Battery chargers shall be designed to protect against overcharging.

(3) Battery circuits shall include an emergency battery cut-off switch to completely disconnect the energy stored in the batteries from the load.

(4) If batteries are of the type to potentially vent explosive gases, the batteries shall be adequately ventilated to prevent accumulation of explosive concentrations of these gases.

(c) *Power dissipation resistors.*

(1) Power dissipating resistors shall be adequately ventilated to prevent overheating under worst-case operating conditions.

(2) Power dissipation grids shall be designed and installed with sufficient isolation to prevent combustion between resistor elements and combustible material.

(3) Power dissipation resistor circuits shall incorporate warning or protective

devices for low ventilation air flow, over-temperature, and short circuit failures.

(4) Resistor elements shall be electrically insulated from resistor frames, and the frames shall be electrically insulated from the supports that hold them.

(d) *Electromagnetic interference and compatibility.*

(1) The operating railroad shall ensure electromagnetic compatibility of the safety-critical equipment systems with their environment. Electromagnetic compatibility can be achieved through equipment design or changes to the operating environment.

(2) The electronic equipment shall not produce electrical noise that interferes with trainline control and communications or with wayside signaling systems.

(3) To contain electromagnetic interference emissions, suppression of transients shall be at the source wherever possible.

(4) Electrical and electronic systems of equipment shall be capable of operation in the presence of external electromagnetic noise sources.

(5) All electronic equipment shall be self-protected from damage or improper operation, or both, due to high voltage transients and long-term over-voltage or under-voltage conditions.

§ 238.427 Suspension system

(a) *General requirements.*

(1) Suspension systems shall be designed to reasonably prevent wheel climb, wheel unloading, rail rollover, rail shift, and a vehicle from overturning to ensure safe, stable performance and ride quality. These requirements shall be met:

(i) In all operating environments, and under all track conditions and loading conditions as determined by the operating railroad; and

(ii) At all track speeds and over all track qualities consistent with the Track Safety Standards in part 213 of this chapter, up to the maximum operating speed and maximum cant deficiency of the equipment.

(2) Passenger equipment shall meet the safety performance standards for suspension systems contained in Appendix C to this part, or alternative standards providing at least equivalent safety if approved by FRA under the provisions of § 238.21.

(b) *Lateral accelerations.* Passenger cars shall not operate under conditions that result in a steady-state lateral acceleration of 0.1g (measured parallel to the car floor inside the passenger compartment) or greater.

(c) *Hunting oscillations.* Each truck shall be equipped with a permanently installed lateral accelerometer mounted on the truck frame. The accelerometer output signals shall be processed through a filter having a band pass of 0.5 to 10 Hz to determine if hunting oscillations of the truck are occurring. If hunting oscillations are detected, the train monitoring system shall provide an alarm to the operator, and the train shall be slowed to a speed at least 5 mph less than the speed at which the hunting oscillations stopped. For purposes of this paragraph, hunting oscillations are considered a sustained cyclic oscillation of the truck which is evidenced by lateral accelerations in excess of 0.4g root mean square (mean-removed) for 2 seconds.

(d) *Ride vibration (quality).* (1) While traveling at the maximum operating speed over the intended route, the train suspension system shall be designed to:

(i) Limit the vertical acceleration, as measured by a vertical accelerometer mounted on the car floor, to no greater than 0.55g single event, peak-to-peak over a one second period;

(ii) Limit lateral acceleration, as measured by a lateral accelerometer mounted on the car floor, to no greater than 0.3g single event, peak-to-peak over a one second period; and

(iii) Limit the combination of lateral acceleration (a_L) and vertical acceleration (a_v) occurring over a 1 second period as expressed by the square root of ($a_L^2 + a_V^2$) to no greater than 0.6g, where a_L may not exceed 0.3g and (a_V) may not exceed 0.55g.

(2) *Compliance.* Compliance with the requirements contained in this paragraph shall be demonstrated during the equipment pre-revenue service acceptance tests required under § 238.111, and § 213.345 of this chapter.

(3) For purposes of this paragraph, acceleration measurements shall be processed through a filter having a band pass of 0.5 to 10 Hz.

(e) *Overheat sensors.* Overheat sensors for each wheelset journal bearing shall be provided. The sensors may be placed either on-board the equipment or at reasonable intervals along the railroad's right-of-way.

§ 238.429 Safety appliances.

(a) *Couplers.*

(1) The leading and the trailing ends of a semi-permanently coupled trainset shall each be equipped with an automatic coupler that couples on impact and uncouples by either activation of a traditional uncoupling lever or some other type of uncoupling mechanism that does not require a person to go between the equipment units.

(2) The automatic coupler and uncoupling device on the leading and trailing ends of a semi-permanently coupled trainset may be stored within a removable shrouded housing.

(3) If the units in a train are not semi-permanently coupled, both ends of each unit shall be equipped with an automatic coupler that couples on impact and uncouples by either activation of a traditional uncoupling lever or some other type of uncoupling mechanism that does not require a person to go between the equipment units.

(b) *Hand brakes.* Except as provided in paragraph (f) of this section, Tier II trains shall be equipped with a parking or hand brake that can be applied and released manually and that is capable of holding the train on a 3-percent grade.

(c) *Safety appliance mechanical strength and fasteners.*

(1) All handrails, handholds, and sill steps shall be made of 1-inch diameter steel pipe, 5/8-inch thickness steel, or a material of equal or greater mechanical strength.

(2) All safety appliances shall be securely fastened to the car body structure with mechanical fasteners that have mechanical strength greater than or equal to that of a ½-inch diameter SAE grade steel bolt mechanical fastener.

(i) Safety appliance mechanical fasteners shall have mechanical strength and fatigue resistance equal to or greater than a ½-inch diameter SAE steel bolt.

(ii) Mechanical fasteners shall be installed with a positive means to prevent unauthorized removal. Self-locking threaded fasteners do not meet this requirement.

(iii) Mechanical fasteners shall be installed to facilitate inspection.

(d) *Handrails and handholds.* Except as provided in paragraph (f) of this section:

(1) Handrails shall be provided for passengers on both sides of all steps used to board or depart the train.

(2) Exits on a power vehicle shall be equipped with handrails and handholds so that crewmembers can get on and off the vehicle safely.

(3) Throughout their entire length, handrails and handholds shall be a color that contrasts with the color of the vehicle body to which they are fastened.

(4) The maximum distance above the top of the rail to the bottom of vertical handrails and handholds shall be 51 inches, and the minimum distance shall be 21 inches.

(5) Vertical handrails and handholds shall be installed to continue to a point at least equal to the height of the top edge of the control cab door.

(6) The minimum hand clearance distance between a vertical handrail or handhold and the vehicle body shall be 2½ inches for the entire length.

(7) All vertical handrails and handholds shall be securely fastened to the vehicle body.

(8) If the length of the handrail exceeds 60 inches, it shall be securely fastened to the power vehicle body with two fasteners at each end.

(e) *Sill steps.* Except as provided in paragraph (f) of this section, each power vehicle shall be equipped with a sill step below each exterior door as follows:

(1) The sill step shall have a minimum cross-sectional area of ½ by 3 inches;

(2) The sill step shall be made of steel or a material of equal or greater strength and fatigue resistance;

(3) The minimum tread length of the sill step shall be 10 inches;

(4) The minimum clear depth of the sill step shall be 8 inches;

(5) The outside edge of the tread of the sill step shall be flush with the side of the car body structure;

(6) Sill steps shall not have a vertical rise between treads exceeding 18 inches;

(7) The lowest sill step tread shall be not more than 24, preferably not more than 22, inches above the top of the track rail;

(8) Sill steps shall be a color that contrasts with the color of the power vehicle body to which they are fastened;

(9) Sill steps shall be securely fastened;

(10) At least 50 percent of the tread surface area of each sill step shall be open space; and

(11) The portion of the tread surface area of each sill step which is not open space and is normally contacted by the foot shall be treated with an anti-skid material.

(f) *Exceptions.*

(1) If the units of the equipment are semi-permanently coupled, with uncoupling done only at maintenance facilities, the equipment units that are not required by paragraph (a) of this section to be equipped with automatic couplers need not be equipped with sill steps or end or side handholds that would normally be used to safely perform coupling and uncoupling operations.

(2) If the units of the equipment are not semi-permanently coupled, the units shall be equipped with hand brakes, sill steps, end handholds, and side handholds that meet the requirements contained in § 231.14 of this chapter.

(3) If two trainsets are coupled to form a single train that is not semi-permanently coupled (i.e., that is coupled by an automatic coupler), the automatically coupled ends shall be equipped with hand brakes, sill steps, end handholds, and side handholds that meet the requirements contained in § 231.14 of this chapter. If the trainsets are semi-permanently coupled, these safety appliances are not required.

(g) *Optional safety appliances.* Safety appliances installed at the option of the railroad shall be firmly attached with mechanical fasteners and shall meet the design and installation requirements provided in this section.

§ 238.431 Brake system.

(a) A passenger train's brake system shall be capable of stopping the train from its maximum operating speed within the signal spacing existing on the track over which the train is operating under worst-case adhesion conditions.

(b) The brake system shall be designed to allow an inspector to determine that the brake system is functioning properly without having to place himself or herself in a dangerous position on, under, or between the equipment.

(c) Passenger equipment shall be provided with an emergency brake application feature that produces an irretrievable stop, using a brake rate consistent with prevailing adhesion, passenger safety, and brake system thermal capacity. An emergency brake application shall be available at any time, and shall be initiated by an unintentional parting of the train. A means to initiate an emergency brake application shall be provided at two locations in each unit of the train; however, where a unit of the train is 45 feet or less in length a means to initiate an emergency brake application need only be provided at one location in the unit.

(d) The brake system shall be designed to prevent thermal damage to wheels and brake discs. The operating railroad shall demonstrate through analysis and testing that no thermal damage results to the wheels or brake discs under conditions resulting in maximum braking effort being exerted on the wheels or discs.

(e) The following requirements apply to blended braking systems:

(1) Loss of power or failure of the dynamic brake does not result in exceeding the allowable stopping distance;

(2) The friction brake alone is adequate to safely stop the train under all operating conditions;

(3) The operational status of the electric portion of the brake system shall be displayed for the train operator in the control cab; and

(4) The operating railroad shall demonstrate through analysis and testing the maximum operating speed for safe operation of the train using only the friction brake portion of the blended brake with no thermal damage to wheels or discs.

(f) The brake system design shall allow a disabled train's pneumatic brakes to be controlled by a conventional locomotive, during a rescue operation, through brake pipe control alone.

(g) An independent failure-detection system shall compare brake commands with brake system output to determine if a failure has occurred. The failure detection system shall report brake system failures to the automated train monitoring system.

(h) Passenger equipment shall be equipped with an adhesion control system designed to automatically adjust the braking force on each wheel to prevent sliding during braking. In the event of a failure of this system to prevent wheel slide within preset parameters, a wheel slide alarm that is visual or audible, or both, shall alert the train operator in the cab of the controlling power car to wheel-slide conditions on any axle of the train.

§ 238.433 Draft system.

(a) Leading and trailing automatic couplers of trains shall be compatible with standard AAR couplers with no special adapters used.

(b) All passenger equipment continues to be subject to the requirements concerning couplers and uncoupling devices contained in Federal Statute at 49 U.S.C. chapter 203 and in FRA regulations at part 231 and § 232.2 of this chapter.

§ 238.435 Interior fittings and surfaces.

(a) Each seat back and seat attachment in a passenger car shall be designed to withstand, with deflection but without total failure, the load associated with the impact into the seat back of an unrestrained 95th-percentile adult male initially seated behind the seat back, when the floor to which the seat is attached decelerates with a triangular crash pulse having a peak of 8g and a duration of 250 milliseconds.

(b) Each seat back in a passenger car shall include shock-absorbent material to cushion the impact of occupants with the seat ahead of them.

(c) The ultimate strength of each seat attachment to a passenger car body shall be sufficient to withstand the following individually applied accelerations acting on the mass of the seat plus the